INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

IAVE

the emerging technical electronics program in local schools

(see page 38)

- Industrial Education and the Conant Study, Rudiger
- Special Education and I-A, Echelbarger and Ferrerio
- Occupational Outlook Handbook, Exton

February, 1960

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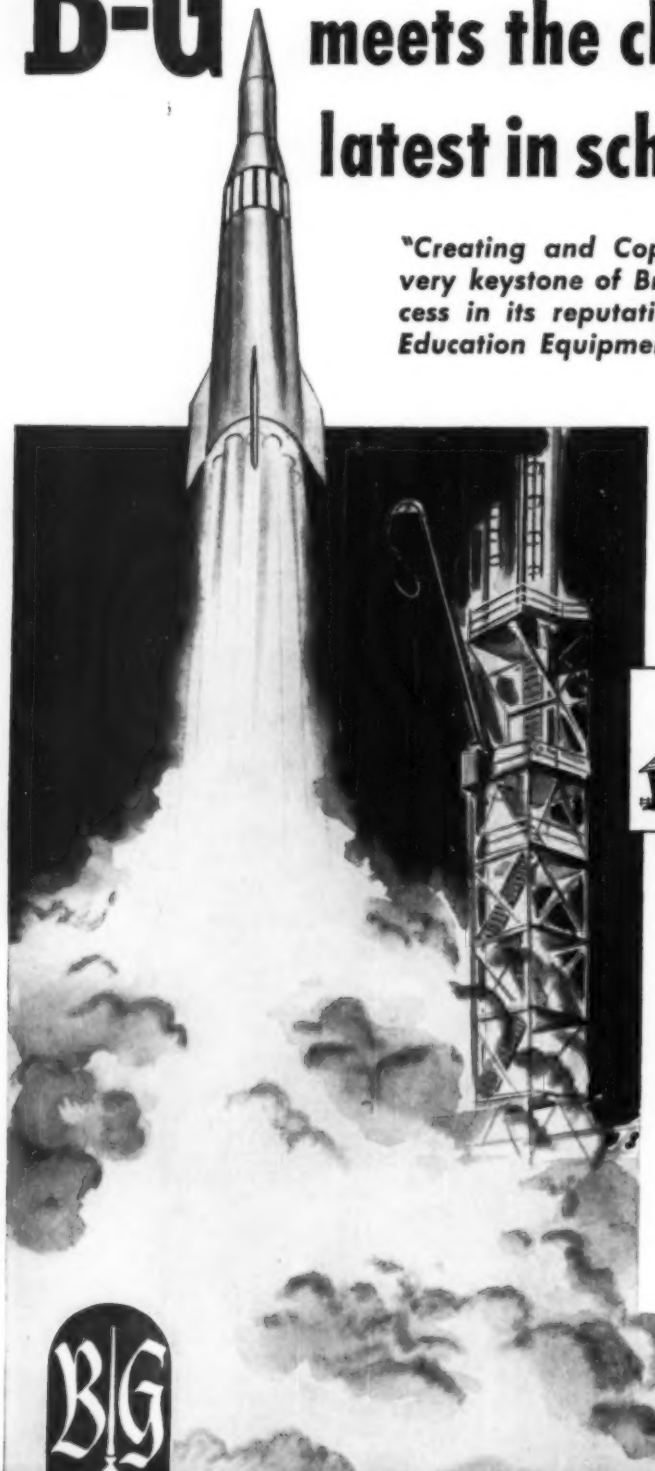

FROM THE DAYS of the little red school house, Industrial Education curriculum, facilities and equipment have grown enormously in size and breadth.

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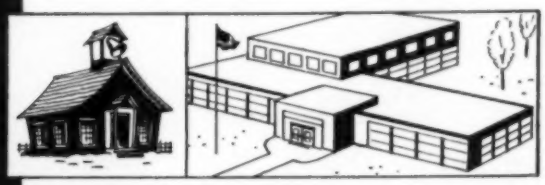

WHERE 50 YEARS AGO, a few schools offering industrial education were considered abreast of the times by including courses and equipment in metal and woodworking, today their number has multiplied, as has the field of Industrial Education grown, reaching into every section of the country to keep pace with the modern strides that have ushered in the electronic age.

THROUGHOUT ALL THIS GROWTH in Industrial Education, Brodhead-Garrett has continuously kept step with the needs of students and their instructors. In many many cases, our closeness to problems even before they arose and their need of solutions have challenged us—and found us meeting the challenge — in the development of new designs, methods and equipment. As America's leading supply source for school shops, the constant challenge of coping with the changes and expansion in curriculum in Industrial Education has been, and will continue to be met, by Brodhead-Garrett.

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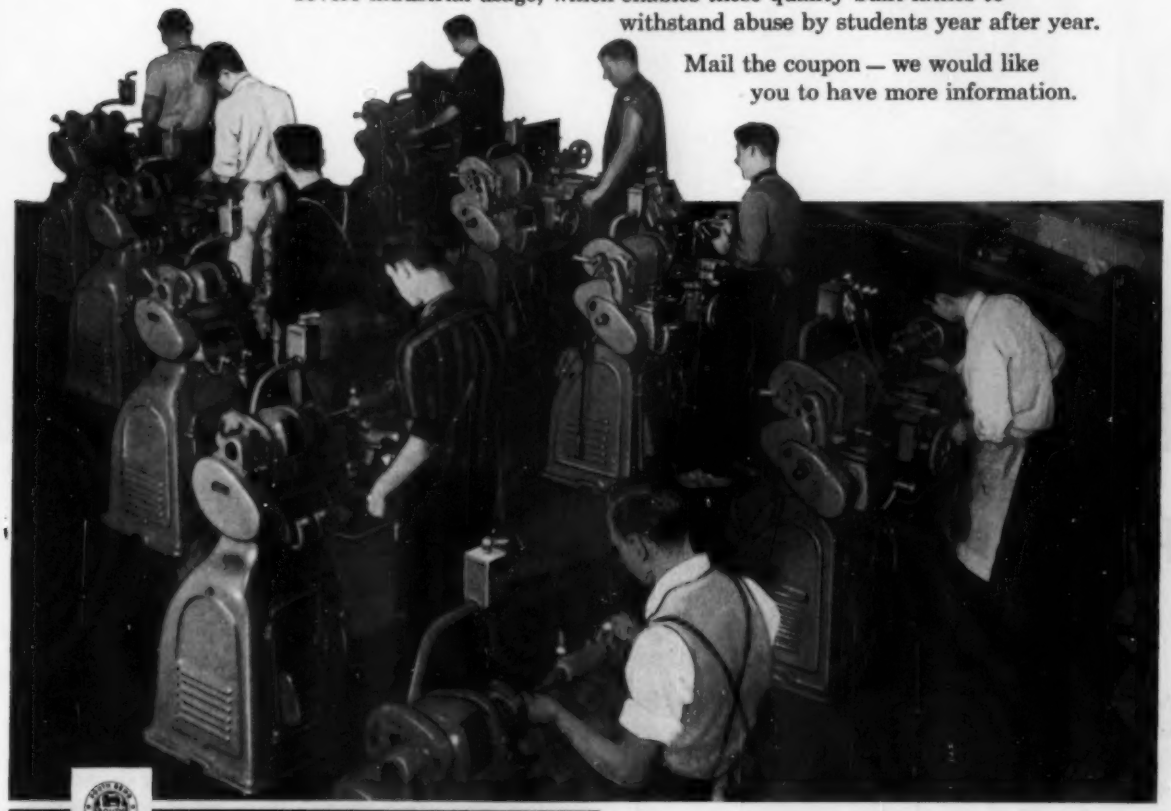

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Vol. 49, No. 2 / February, 1960

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what does research say?/ facts presented by i-e research

Are you curious about the answers to these questions:

"What content should be included in woodworking?"

"Do students learn more in drawing if they are tested daily?"

"If junior high school boys had a chance to select the content for a general shop course, what would it be?"

"How valuable is demonstration as a teaching tool?"

"Are drafting practices used in the school the same as those used in industry?"

These are but a few of many questions whose answers can be found by reviewing the research in industrial education. A booklet, published by the U. S. Office of Education, titled "Research in Industrial Education" lists all of the theses completed between 1930 and 1955. Many important findings are included in these studies.

Would you benefit from a monthly review of the important research in our area with its implications for the improvement of industrial education? If so, please tell us! This column is the second in a series of what we hope are appealing features. We are testing them for your approval or rejection. The first, on page 4 of your IA/VE for January, had information on occupations. In your IA/VE for March will be "Then and Now," a review of changing attitudes toward a prominent industrial education problem many years ago and today.

All doctoral theses in all fields are available on microfilm. The complete theses can be purchased for as little as three to seven dollars from *Microfilms*, Ann Arbor, Michigan. The lists of available microfilms can be found in any good college or university library. The microfilm reader needed for reading the microfilm is on call in most university and public libraries.

Answers to the Questions

Let's get back to the questions raised earlier:

"What content should be included in woodworking?" The answer to this might be found in two important studies. One is Neubauer's historical study[1] of wood technology in Western culture. In it he gave a detailed report of the evolution of woodworking tools and materials. He suggested many important topics that ought to be included in a modern woodworking program. Anderson[2] reviewed the research findings of the Forest Products Laboratory and compared these with the content found in woodworking textbooks. On the basis of this comparison he outlined the important content that should be included in a good woodworking course.

"Do students learn more in drawing if they are tested daily?" Evidence collected by Mudgett[3] indicates that daily testing in drawing is the very best method of keeping students together and, at the same time, of assuring that they learn the most in the amount of time available. Students who are tested daily ask more questions and participate more actively in discussions. They also make steady improvement in the way they take class notes, show more interest in the subject matter, and complete their assigned problems. On the other hand, students who were tested infrequently were less successful in drawing.

"If junior high school boys had a chance to select the content for a general-shop course, what would it be?" Jenkins[4] made a study of the content that should be included in a required industrial arts course for boys. He obtained opinions from ninth-grade boys, adult laymen, and people in industry. As a result of this survey, he outlined important skills, information, attitudes, and habits that should go into building a basic one-year shop course. Interestingly enough, the geographic location of the students or the community in which they lived had no effect on opinions expressed. It has often been suggested that the industry of the community should effect what is taught in industrial arts. This study showed that this should have no effect on basic course content.

"How valuable is the demonstration as a teaching tool?" Since the demonstration is the basic teaching method used by most industrial teachers, the results of a study by Worthington[5] should be of interest to all of us. He found, among other things, that the demonstration was extremely valuable in teaching basic assembly skill. Students who did not see a demonstration required a good deal longer to learn. According to this study, the more complex the skill, the more important the demonstration is to quick learning.

"Are drafting practices used in the school the same as those used in industry?" Randel[6] compared the practices in industry with drafting as it is taught in engineering schools. He found several important differences in the tools, materials, and procedures followed in industry as compared to those followed in the engineering schools.

[1]Neubauer, Gerhardt W., "The Significance of Selected Aspects of Wood Technology for Western Culture," Ph.D. thesis, University of Minnesota, 1956.

[2]Anderson, Herbert, "Analysis of Contents of Woodworking Textbooks Based on Research Findings of The Forest Products Laboratory," Ed.D. thesis, University of Missouri, 1953.

[3]Mudgett, Albert, "The Effects of Periodic Testing on Learning and Retention in Engineering Drawing," Ph.D. thesis, University of Minnesota, 1956.

[4]Jenkins, James, "Content (Tool Manipulation, Information, Attitudes, and Habits) of Required Industrial Arts for Boys as Developed from the Expressed Experience of Youth, Adults, and Industry," Ed.D. thesis, Pennsylvania State University, 1958.

[5]Worthington, Robert, "Factors Affecting the Delayed Imitation of a Demonstrated Psychomotor Skill," Ph.D. thesis, University of Minnesota, 1958.

[6]Randel, Stephen, "Comparison of Drafting Practices in Industry with Drafting as Taught in Engineering Schools," Ed.D. thesis, University of Missouri, 1958.

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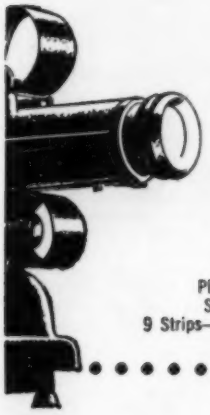
STANLEY SHOP TALK



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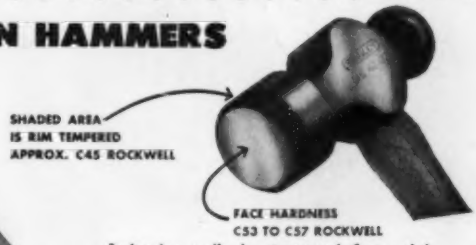

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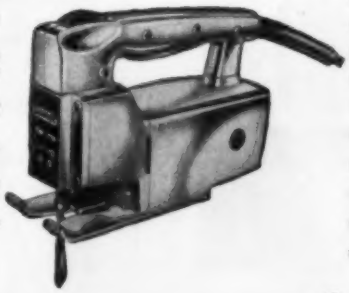

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the bulletin board / news notes and trends in industrial education

GRAPHIC ARTS SURVEYED

In response to a questionnaire sent to secondary schools and colleges offering graphic arts education program, 774 answers reported a total of 1176 instructors and 72,995 students enrolled.

The survey was conducted by the Education Council of the Graphic Arts Industry, Inc.

Replacement value of printing equipment in the schools reporting represented $32,578,715, with an estimated total value of annual purchased supplies amounting to $1,872,122. The estimated total cost of equipment expected to be purchased in the next five years is $5,707,590.

The subjects taught included: hand composition, 742; hand fed platen press, 735; layout, design, and color, 565; bindery, 564; and silk screen, 362.

TRENDS IN CONSTRUCTION EMPLOYMENT

Rapidly rising construction activity during the coming decade could lift the industry's employment some 45 per cent over current levels by 1970, according to a recent report by the U. S. Department of Labor.

Since 20 to 25 per cent of the craftsmen in the building trades will retire or die in the ten-year period just ahead, the number of new workers entering the construction field in the 1960's should equal at least 65 to 70 per cent of the current near-3-million workforce in order to provide the needed net growth in construction manpower.

Craftsmen make up nearly 50 per cent of construction's work force — a far heavier concentration of skilled workers than in manufacturing industries where they account for only 20 per cent of the labor force.

ENGINEERING ENROLLMENTS DROP

Undergraduate enrollment in the nation's 234 engineering colleges and universities declined 5.4 per cent this fall in the face of an all time high in general college enrollment, it was announced by U. S. Commissioner of Education Lawrence G. Derthick. He said the number of full-time and part-time undergraduates in engineering schools this fall is 243,000 compared with 257,000 in the fall of 1958. General college enrollment rose from 3,259,000 in the fall of 1958 to 3,402,000 this fall, an increase of over 4 per cent.

quote

To be effective in the future development of trade and industrial education, a vocational administrator must have six qualifications according to Ralph C. Wenrich, chairman of the University of Michigan Department of Vocational Education and Practical Arts:

1. He must be a leader.
2. He must be a curriculum specialist.
3. He must know his community.
4. He must be interested in developing a comprehensive program.
5. He must co-operate with those administrators giving leadership to other phases of the school program.
6. He must be concerned with the improvement of instruction.

unquote

ADULT INDUSTRIAL EDUCATION IN L.A.

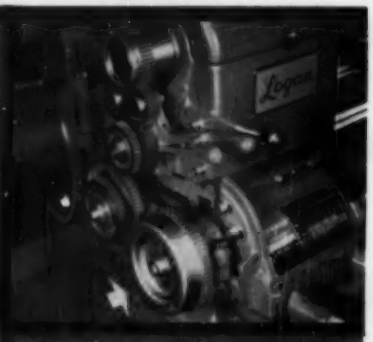
The adult education program in the Los Angeles, Calif., schools is meeting a vital need in the community by presenting knowledges, skills, and attitudes necessary

(Concluded on page 8)

new safety feature

Logan

Automatic Safety Gear now standard equipment on 10" and 11" models



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10" Lathe

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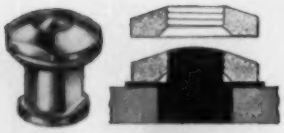

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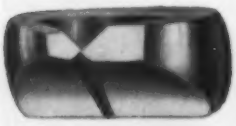

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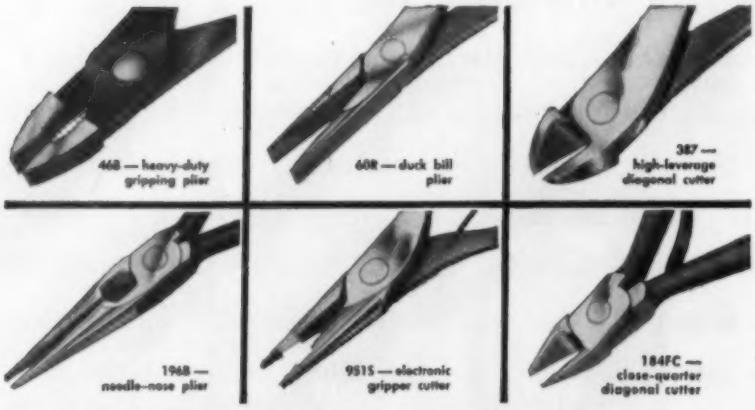
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THE BULLETIN BOARD

(Concluded from page 6)

to meet demands of today's modern society, a report to the board of education claimed.

The district has 27 "adults" schools with an annual enrollment of approximately 170,000 served by courses in ten major areas of learning. While heaviest concentration of courses — 656 or 29.9 per cent of the 2196 courses — are in academic education, there are 334 or 15.2 per cent in phases of industrial education.

INDUSTRIAL TECHNOLOGY PROGRAM ADDED

A four-year curriculum in industrial technology has been approved at New Mexico Western College in Silver City. The program, which becomes effective in September, 1960, will include mathematics, business, physical science, and technical drafting and will emphasize metals, power, and printing technologies. Options in the technology major will permit the student to pursue his technical work on a general industrial basis or he may elect to specialize in one of the major technical laboratories.

Besides this additional program in industrial technology, undergraduate and graduate work in industrial arts education is offered.

VOCATIONAL GUIDANCE CENTER

A vocational guidance and resource center has recently been established in the San Diego County, Calif., schools with the help of NDEA funds.

The center provides a current file on vocational guidance and testing materials for use by teachers, counselors, etc. Occupational pamphlets, professional books, psychological bulletins and tests can be studied at the center or requested for use in the district's schools.

surveying the ----------school scene

- In 1959, the public schools enrolled 36,399,802 students, 25,025,095 in the grades and 11,374,707 in the junior and senior high schools. This represents an increase of 4.1 per cent over the previous year and 44.5 per cent more than a decade ago.
- An 11-year survey by Dr. Lawrence Vredevoe, professor of education at UCLA indicated that 2835 of 3500 prospective high school teachers said that poor discipline in schools was their main worry.
- Quoted in a recent issue of *Newsweek*, historian Henry Steele Commager envisions a fully automated classroom in the 1960's with automatic teaching machines, language laboratories. Also, the growing leisure time in America will "sweep adults into education by the millions."
- A decline in school bond sales, contract awards, and construction work probably is attributable more to a slow down in school population than to tight money or bond issue rejections, according to Frank E. Morris, research director of the Investment Bankers Association.

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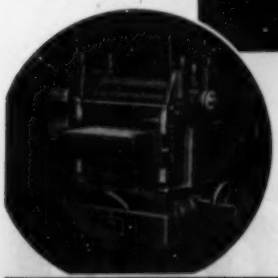

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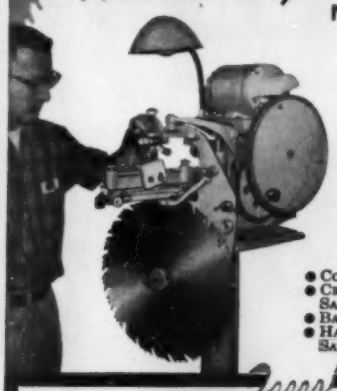

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"Shop Facilities for Teaching Radio-Electronics-Television" by Paul B. Zbar, head, electronics dept., New York Trade School, is an excellent report on "suggestions for upgrading instruction in electronics" through improved equipment.

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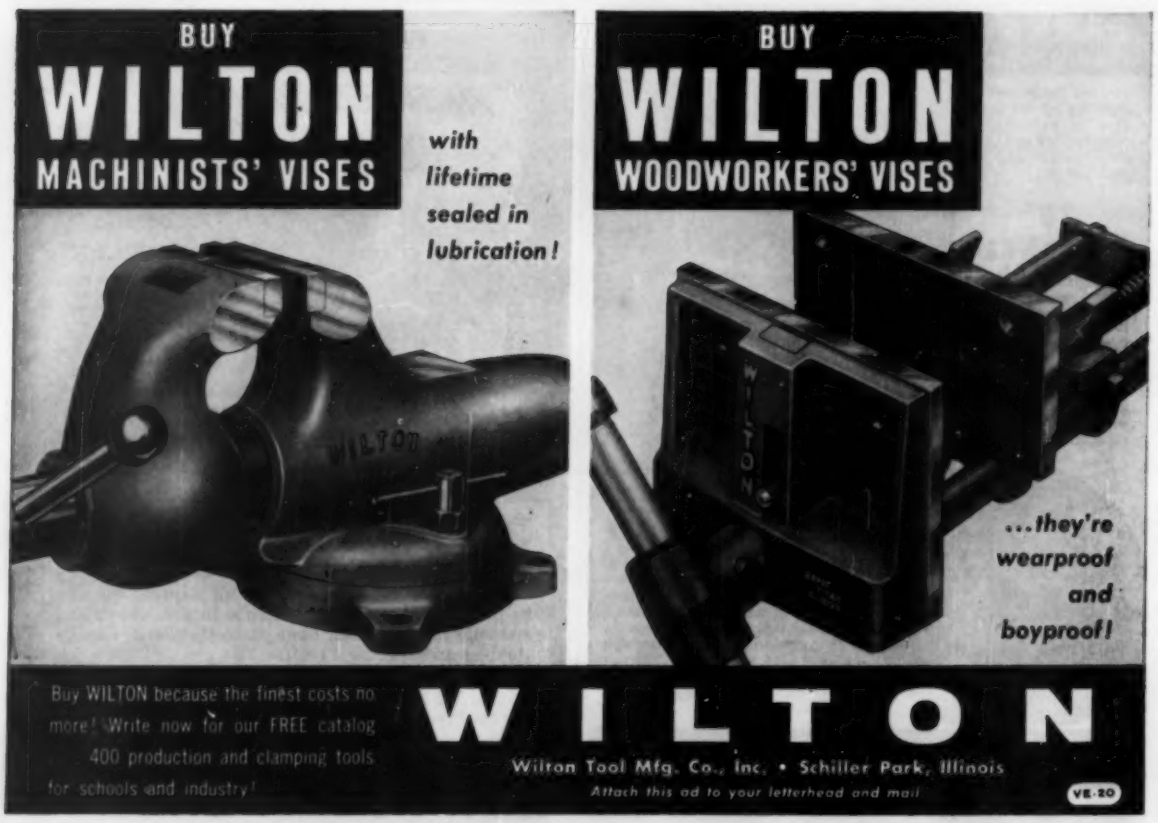
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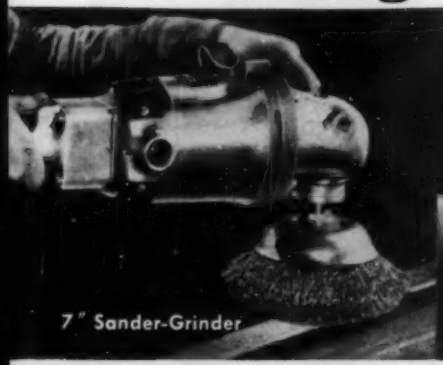
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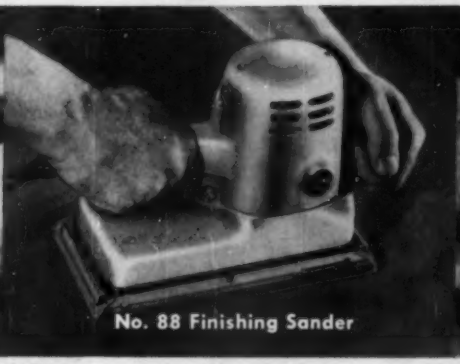
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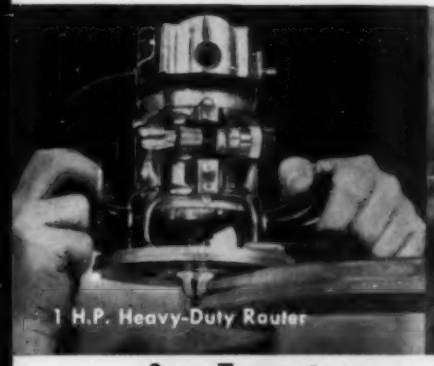
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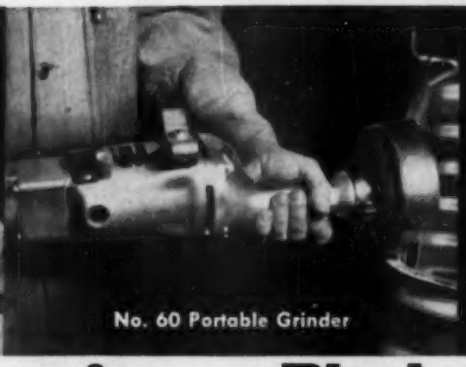
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INDUSTRIAL ARTS: HARD OR SOFT EDUCATION?

Since the advent of Sputnik I, literally millions of words have been written about the faults of education. Today it is almost impossible to pick up a magazine or newspaper, to listen to the radio or watch TV, without being assailed with the problems of education. Everyone seems to have criticisms of our public schools and many are quick to suggest their own solutions to our problems.

It seems to us that American education has always swung either too far to the right or too far to the left, rather than following the middle road. During the depression years and into the '40's, we were in the era of the child-centered school. Education's main attention was directed toward helping students to become well-adjusted and happy individuals. In their endeavor to make the student happy and free from all frustration, many educators eliminated homework, included "easy" courses such as boy's cooking and baton twirling, stopped using textbooks, provided for more social activities, reduced the length of the school day, and carried on many other short-changing educational practices.

Now, events seem to indicate that these schools went too far and the swing is in the other direction. Our educational system is constantly being compared to that of Russia and other European countries. Today the hue and cry is for a subject-matter content . . . hard content such as science, mathematics, and English. The demand is for more solid subjects, more homework, and a longer school day. "Let's get rid of the frills." And among these, industrial arts is often mentioned.

Is industrial arts a frill course? Is it part of soft education? Do we appeal only to students with below-average intelligence? Is there no challenge in industrial arts for the bright student?

We have a question of our own: "What is the difference between hard and soft education?" So often, subjects such as English, science, mathematics, and social science are considered the core of hard education while physical education, industrial arts, home economics, and art and music are placed in the soft category. *What is the difference between hard and soft education?* Some educators feel the difference lies in the subject matter, others in the teaching method, the use of instructional materials, or the standards of attainment. Perhaps the difference between hard and soft education can be found in all of these.

Let's look at the differences:

Hard	*Soft*
It requires maximum effort.	It is easy, fun, and requires little effort. There is plenty of loafing.
It emphasizes the ability to read and understand.	There is little or no reading or interpretation.
It teaches appreciation of hard work and its rewards.	Quality is unimportant. In fact, good students are ashamed to do their best.
It teaches students about the real world in which they live.	It emphasizes immediate social adjustment and fun.
It evaluates student progress at frequent intervals. There are plenty of tests.	There is seldom a check on progress of students. Tests are seldom given.
It utilizes a textbook and other basic instructional materials.	Basic instructional materials are seldom used.
It emphasizes basic understandings, concepts, skills, knowledge, appreciations, and attitudes.	Students learn some isolated information and a few skills.

If industrial arts is to be considered part of the hard core of education, what must we do? It seems to us that we must first achieve general agreement as to what industrial arts is. It's surprising to see the many different ideas you receive when you ask a group of industrial arts teachers for a definition. Some suggest that industrial arts is primarily concerned with creativity and self-expression. Others emphasize skills and tool manipulation. Others think that it deals with the industrial and economic aspects of American life. Still others believe that industrial arts is primarily a teaching method and that content is relatively unimportant. Is it possible to get a definition of industrial arts that will be agreeable to all of us?

Another question we must answer is: "What should the subject-matter areas of industrial arts be and which are the most important?" We feel that the following must be considered in about this order: (1) power mechanics, (2) metalworking, (3) electricity, (4) drawing or drafting, (5) woodworking, (6) graphic arts, (7) ceramics and textiles, and (8) arts and crafts.

The third question we must ask is: "What should be the standards for each subject-matter area at each age-grade level? How much skill, how much technical information, how much related math and science, how much design, how much planning, and how much time for project building should be allowed?"

The fourth question concerns the problem of what methods and techniques of teaching to use. This brings us to such problems as whether to use basic textbooks and workbooks, the importance of standardized tests, how much attention to give to design and planning, whether or not to give homework and outside assignments, and whether we should include applied math and science. These are only a few of the questions in this area we must answer.

The final but all-important question is this: "Are there basic concepts, understandings, applications, information, skills, attitudes, and appreciations in the area of industrial arts *that are good for all?*" If the answer is *yes*, then let's get about the job of finding *what these are*. Let's build our school program on the distinct contribution of our field to general education. Let's make sure we have a planned program for each level — elementary, intermediate, and high school — that we can point to and say, "This is good for Johnny whether he lives in Boston, Minneapolis, or Los Angeles."

Should industrial arts be soft, hard, or medium-hard education? We as a profession must decide *by ourselves* what we stand for. We certainly must not permit general educators to decide *for us* into what category we fall.

John L. Feirer

Industrial Education and the Conant Study

E. ROBERT RUDIGER

- Dr. Conant's study of the comprehensive high school was undertaken to ascertain whether it could do three things well: (1) provide a **general education for all** American youth; (2) provide **terminal courses** to develop a marketable skill; and (3) provide significant courses in the "solids" leading to **professional study** in a university.
- The findings of this study, considered by many to be one of the **"finest, most constructive contemporary reports** on the secondary school program" of the U. S., contain implications for industrial education.
- Here is a **concise report of the recommendations** of the study for industrial educators with a summary of the important suggestions for all areas of the high school.

During the present period of educational criticism and evaluation there has emerged a single study which has been more widely accepted than any other. It was conducted in 1957–58 by Dr. James B. Conant and a specially selected staff under a grant from the Carnegie Corporation. The final report of this study, *The American High School Today*, is now available in book form.* This book is considered by many to be one of the finest, most constructive contemporary reports on the secondary school program of the United States.

*McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York City, N. Y., $1.

Dr. Rudiger is professor of education, Stout State College, Menomonie, Wis.

Commenting on that report, the September 14, 1959, issue of *Time* magazine stated:

> Few men have tried with calmer good sense to work to this end (that of giving citizens faith and direction in education) that James Bryant Conant, Volunteer "Inspector General" of the U. S. public schools. Among plain citizens, the former president of Harvard (1933–52) has won towering respect since his *The American High School Today* was published early this year. Nobody has done more to convince Americans that high school can improve — "with no radical change."

Perhaps what makes the Conant study so widely accepted and of such great value is the fact that Dr. Conant and his staff were interested not only in education of the bright student, but also in how the high school could educate all its students. Included in this report are several recommendations designed to better challenge those capable boys and girls whose educational plans lead toward professional occupations and also those youngsters who are capable of entering skilled, semi-skilled, or unskilled occupations.

In Conant's report, and in his speech at the National School Boards Association convention in Miami Beach in April, 1958, are many suggestions and points of information which can and should lead to further expansion and improvement of the industrial arts and vocational-industrial education programs in our public secondary schools.

Recommendations and Comments Concerning Industrial Education

Industrial arts in the Conant report is considered to be a study of the various basic industrial activities involving the uses of tools and such materials as wood, metal, drawing, and electricity. Its beginning level courses are regarded as terminal for consumers of industrial products and services. Vocational-industrial education is designated as that phase of vocational education which prepares individuals for industrial employment on skilled or technical levels. Because the study deals with youth of secondary school age, it does not offer any recommendations for the other phase of vocational-industrial education — that of up-grading or supplemental type instruction.

In the schools which Conant visited, he noted that the better, advanced-level industrial arts courses were preparatory or exploratory in nature and were either supplemental

or were closely related to a program of vocational-industrial education.

He observed that the presence of a good vocational-industrial program — organized not only upon the basis of the needs of the community or the area, but also upon the use of special advisory committees composed of management and labor — actually provided somewhat the same incentive to industrial arts students as did the offering of college level courses in the senior year to those who had elected to pursue the college-preparatory program. He also commented that in areas where good vocational-industrial programs were available, the whole industrial arts program seemed more professional in nature.

Conant's study recommends that every student take a program consisting of both general and elective courses. Among the required courses he suggests are four years of English, three or four years of social studies, one year of mathematics, at least one year of science, and a senior course in American problems or American government. The other course requirements would be electives based upon a central core leading toward either a vocation or further academic education.

Vocational Goals

Conant feels it highly desirable that as many students as possible have in mind their vocational goal when they reach their junior and senior years of schooling. Those who are of college caliber would then be able to pursue a program that would better prepare them for college entrance. Likewise, those who are interested in and capable of preparing for skilled-level employment could develop abilities which would be marketable upon graduation; otherwise they would take preparatory or prevocational courses necessary for further schooling or, perhaps, apprenticeship if required.

In making his survey, Dr. Conant noted that students pursuing voca-

recommendations of the Conant report

1. The Counseling System — There should be one full-time counselor or guidance officer for every 250–300 pupils in the high school.

2. Individual Programs — It should be the policy of the school that every student have an individualized program; there would be no classification such as college-preparatory, vocational, or commercial.

3. Required Programs for All — 4 years of English, 3–4 of social studies, 1 of math, and 1 of science, plus a "significant sequence" of electives.

4. Ability Grouping — Students should be grouped according to ability subject by subject.

5. A Supplement to a High School Diploma — Each student should be given a durable record of the courses studied in four years and grades obtained.

6. English Composition — The time devoted to English composition during the four years should be half the total time given to the study of English; a school-wide composition test should be given in every grade.

7. Diversified Programs for the Development of Marketable Skills — Half a day is required for 11th and 12th grades for vocational work.

8. Special Considerations for the Slow Reader — Ninth-graders who read at a level of 6th grade or below should have special attention by special teachers.

9. Programs for the Academically Talented — School policy should be adopted in regard to elective programs for academically talented as a guide to counselors.

10. Highly Gifted Pupils — Identification of this group, about 3 per cent nationally of the student population, should start in the 7th or 8th grade.

11. The Academic Inventory — Annual academic inventories, summarizing the programs of academically talented, without giving names, should be supplied school boards.

12. Organization of the School Day — There should be at least six periods in addition to the required physical education and driver education.

13. Prerequisites for Advanced Academic Courses — Standards in advanced courses should be such that those who enroll in each successive course of a sequence have demonstrated the ability to handle that course.

14. Students Should Not Be Given a Rank in Class According to Their Grades in Subjects — Desire to rank high has led bright students to elect easy courses in order to get high grades.

15. Academic Honors List — At the end of each marking period a list should be published of students who had elected courses recommended for the academically talented, and had made an average grade of "B."

16. Developmental Reading Program — *A* school should have equipment for a developmental reading program.

17. Summer School — The school board should operate a tuition-free summer school, both for repeaters and for the ambitious.

18. Foreign Languages — Guidance officers should urge the completion of a four-year sequence of one foreign language if the student demonstrates ability in handling foreign languages.

19. Science Courses — All students should obtain some understanding of the nature of science and the scientific approach, given in a course divided into three sections grouped by ability.

20. Homerooms — For the purpose of developing an understanding between students of different levels of academic ability and vocational goals, homerooms should be organized in such a way as to make them significant social units in the school.

21. Twelfth-Grade Social Studies — This course should develop not only an understanding of the American form of government and of the economic basis of our free society, but also mutual respect and understanding between different types of students.

"... Vocational education is not offered in lieu of general academic education, but grows out of it, supplementing and enhancing it. ..."

— *Conant*

tional goals showed less tendency to waste their school time and had a much more wholesome attitude toward their school work. He observed also that the so-called "easy programs" selected by some students were not those of students with vocational goals, but rather were those of students who were far from sure why they were in school at all.

Because skilled trades and technical fields of employment require average or better abilities, he recommends that the vocational-industrial program enroll a considerable number of average or better students. In order to do this, Conant feels that both school administrators and guidance counselors should have an appreciation of the real significance of those areas of employment. He states further that if the vocational-industrial education programs (and we may assume that he includes the advanced industrial arts courses) are to be successful, they must be protected by every school administration from becoming dumping grounds. Inasmuch as the average I.Q. among the various skilled trades ranges from approximately 90 to 115, it is logical that we accept only those students with this same educational potential for preparation to enter these fields of employment.

For the Less-Than-Average

In discussing the programs of students of less-than-average abilities (those ranking just above the mentally retarded and particularly those in the ninth grade who read at a level of the sixth grade or below), Dr. Conant recommends that they be grouped in special sections so that they can receive remedial and other special instruction under instructors who are sympathetic and who are interested in working with young people of this type. He feels, too, that the group should be vocationally oriented, but not into those vocations that call for average or better-than-average students. Conant's recommendations further emphasize this point by suggesting that this special group be kept out of such regular vocational courses as carpentry and machine shop work and auto mechanics. (In this case, we could assume that the industrial arts courses of a general unit nature would be terminal for these students because such individuals will no doubt enter the labor market at either a semi-skilled or unskilled level.) In this same recommendation Dr. Conant warns that this group of slow learners is not to be confused with the mentally retarded, who he feels should be considered as a special problem.

The Conant study also advocates that in all required subjects and in those subjects elected by students with a wide range of ability, students should be grouped according to ability, subject by subject. The author and his staff feel that three groups would be sufficient: one for the more able learners in a subject (in the case of industrial arts, perhaps the potential technicians and engineers), one for the middle group (the potential skilled tradesmen), and one for the slow learners who need special attention (the potential semiskilled or unskilled workers).

Another significant recommendation deals with the number of school periods per day. This study specifies that the school day should have at least six periods in addition to the required physical education and driver education. Such an arrangement would mean a seven- or eight-period day composed of periods of about 45 minutes in length. Shop periods and laboratory periods would then operate on a double period basis and would thereby permit better scheduling of shop activities. This arrangement would also encourage the potential college-oriented students (those who will choose engineering, etc.) to enroll in advanced unit-type courses, for instance, machine shop and mechanical drawing. Such a recommendation is especially significant because of the growing trend of engineering colleges to exclude shop work from their curriculums.

In addition to the preceding recommendations and comments, Conant suggests that in conjunction with the high school diploma, each graduate should receive a durable record of all courses and grades which he has completed. This record should be publicized and employers should request it rather than the diploma when evaluating a job applicant.

In Summary

The importance of maintaining efficient schools to develop our future citizens so that they will be able to contribute to the maximum of their capabilities is best summarized in the recent government publication entitled *Our Manpower Future 1955–1965*. This report predicts that in order to meet the needs of our nation as it is affected by increased birth rate and increased longevity, our labor force must expand by at least 10 million workers during the period 1955–65. Because the nation does not have enough men, half of this increase will be made up by women. Accompanying this increase will be expected percentage increases in professional and technical workers, managers, skilled workers and semi-skilled workers. It is predicted that we will notice at the same time, a further decline in the percentages of farmers and unskilled workers.

If America is to maintain its present standard of living in the future, our economy will demand more workers: workers better selected and better educated.

In view of the fact that the largest single group of workers in our nation's work force is that composed of industrial workers, it is highly important that industrial arts teachers be more alert in identifying potential skilled workers at the level of beginning courses. Once such young people become interested, they should be offered a continuing program in meaningful sequence leading to marketable skills upon graduation or, if their vocations demand education beyond high school, then the advanced industrial arts courses should be pre-vocational in nature, designed to provide these students for the next step with thorough preparation.

At the same time, vocational-industrial classes must continue to improve the quality of their offerings. ◀

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industrial arts and special education

▶ The **role of industrial arts in special education** — from those phases which deal with the gifted to those concentrating on the physically and mentally handicapped — is becoming an increasingly important concern for industrial educators.

▶ On the following pages are two articles discussing two aspects of this subject: (1) a sketch of the creation of **facilities for the physically handicapped;** and (2) a detailed report on **how junior high school i-a accelerated "slow" readers.**

Industrial Arts for the Physically Handicapped

ROBERT V. ECHELBARGER

The birth of an industrial arts program at The Crippled Children's School in Jamestown, North Dakota, evolved from a vision of the founder of the school. This vision included shops, operated by physically handicapped persons, made self supporting by commercial products which would assure continuation of rehabilitation work for future students. It lay dormant for a number of years and recurred again in the mind of the present superintendent in a much modified form when he visited a hospital school for the handicapped where an industrial arts program had been newly completed.

Jamestown area crippled children were not being given the opportunity to learn about the industrial society in which they would soon be expected to live, work, and play. The shop work so vital to the industrial arts program would provide the opportunity for students to exercise twisted limbs and taut muscles and to make use of compensatory motions to replace useless limbs.

Three Questions

In answer to the question, "what form would the program take?" authorities in the specialized field of industrial arts for the physically handicapped were consulted. Rough drawings as to the physical building were made along with a list of the activities that were to be included tentatively in the program.

The major question, "How much would the program cost?" came up and was answered in the form of architectural drawings and estimates of building costs, equipment costs, and operating costs.

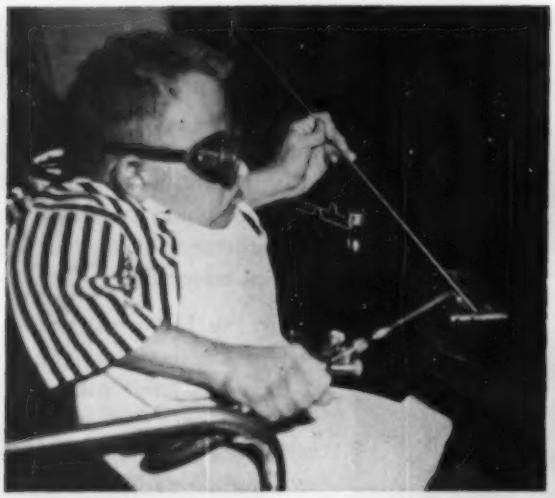
When the estimated cost was established, another question arose. "Can this school, which is supported only by donations, obtain the necessary funds?" Considerable study and thought resulted in three sources of funds — a Ford Foundation grant, Hill-Burton funds, and donations for expansion from many friends of the school. The vision was brought into the realm of tangible possibility for the first time.

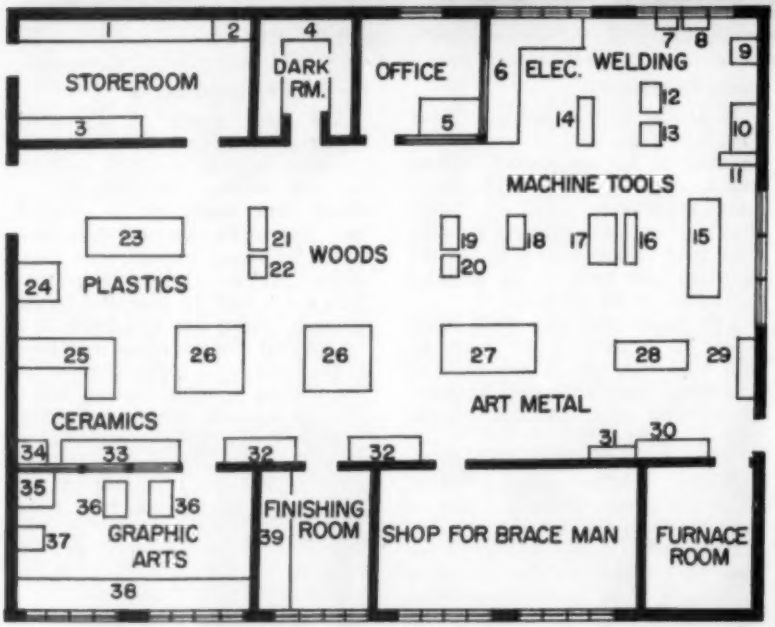
How the Program Serves

The basic needs of physically handicapped students are generally the same as those of youth throughout the nation. The methods by which these needs can be realized vary due to the physical difficulties of the individual student. How these needs differ from those of the average person can best be described by an example. Jimmy can be considered a bright alert student whose assets are in the form of an outgoing personality, a drive to better himself, and a pair of capable hands. He differs from the ordinary high school student only in a physical sense. Jimmy's physical limitations are such that he will always be confined to a wheel

Mr. Echelbarger is a member of the industrial arts department of The Crippled Children's School, Jamestown, N. Dak.

facilities for the physically handicapped





1. Lumber rack; 2. vertical sheet rack; 3. plywood rack; 4. cabinet; 5. desk; 6. electricity bench; 7. buffer; 8. grinder; 9. welding table; 10. soldering table; 11. power hacksaw; 12. milling machine; 13. metal shaper; 14. metal lathe; 15. worktable; 16. jointer; 17. table saw; 18. bandsaw; 19. sander; 20. jigsaw; 21. drill press; 22. portable tool rack; 23. craft table; 24. plastic press; 25. ceramic bench; 26. woodwork bench; 27. metal bench; 28. shop on a bench; 29. wood lathe; 30. glue table; 31. tool panel; 32. locker bench; 33. locker bench; 34. kiln; 35. type case; 36. drawing table; 37. pilot press; 38. cabinet; 39. cabinet

chair due to a condition called Osteogenesis Imperfecta, which results in brittle bones that break very easily. He is in the process of planning his future.

With the opportunity to explore various industrial activities through an industrial arts program, he will be able to make the difficult decision of a vocation or profession in an objective manner. This exploration takes the form of learning experiences in relation to our industrial society. He can learn what his likes and dislikes are; he can discover for himself those activities in which he is physically capable to work and compete with others. From exploration of industrial procedures, Jimmy can develop interest, build skills, and, most important of all, build confidence in his own abilities.

Motivation Improved

Handicapped students appear to have a slight advantage in motivation due to the fact that they recognize their limitations both mentally and physically and thereby strive to either overcome them or to live with them.

▶ how one school's industrial arts program "awakened" reluctant junior high readers —

Try Industrial Arts for Retarded Readers

ANTHONY J. FERRERIO

All of the desirable features necessary for a successful reading program for retarded readers are found in the industrial arts area. There is intrinsic interest in the area — the desire of children to make things, to engage in manipulative activity, to learn about processes, to explore, to experiment. All these are an inherent part of the industrial arts program.

The industrial arts shop offers an atmosphere in which children feel they are and can be successful. It provides a rich, varied, and enjoyable setting in which learning reading skills can be made a component part of an enjoyable activity, rather than an isolated exercise.

The industrial arts program offers a meaningful context for reading. In this area context is concrete and real, involving tools, materials, and processes. The word and the object, the written direction and the actual manipulative process, are nicely connected.

The industrial arts area provides the type of situation in which the child is encouraged to help himself, to learn by himself. This, after all, should be one of the important goals of any teaching program. Children are much more desirous and able in trying to direct their own activities, to overcome difficulties, to improve their abilities than we realize. The industrial arts program is most valuable here. The pupils are certainly interested in the "know how" of the area. If the ability to read a new word, a phrase, a sentence will help them in this strategy, they will be so much more eager to read that word or sentence. Thus the real intrinsic motivation existing in this area is simply incalculable.

The industrial arts area provides a relaxed, friendly, co-operative situation closely akin to that found in the playground, involving the satisfactions and concomitants of play. Pupils are alert and eager, actively in search of clues, ready to take advice. When it is possible for the remedial reading teacher to work with children in the industrial arts shop, with its quasi-play setting, these characteristics of play can be used to advantage in helping children to improve in their reading ability.

Firsthand experiences rank high as a technique in developing word meaning and other reading skills. The many activities of the industrial arts program provide real firsthand experiences in abundance.

The Reading Program at Dewey JHS

The actual teaching of reading in the shop by the reading teacher was started recently at Brooklyn's Dewey Junior High School. While it is not possible now to give any test results or data as to the effectiveness of the program, there is no question of the fact that the activity had given added impetus to the reading program and the interest in reading of the pupils involved. It has awakened their enthusiasm.

The teacher has been working with two adjustment classes, composed of retarded and "reluctant" retarded pupils. She states that at first the boys were resentful — they "flared up" — because she was interrupting their shop work. It took some time to get them settled.

Methods Used

The methods used involve experience charts, flash cards, matching games, and the use of concrete objects.

The experience charts deal with the use of a tool, the care of shop equipment, good work habits, a process, safety rules. The following is an example of the material on a chart: (1) live sockets and wires touched with metal objects cause bodily harm, and (2) loose clothing may catch in machines and cause bodily harm.

Words that are similar in the sentences are pointed out. Difficult words are put on the board, discussed, and used in sentences. Individual children are given flash cards to match with words on the chart.

In one lesson, the children were learning about wood fastening. The teacher discussed this with them by having them answer such questions as "Why do we have to fasten wood together?" "What do we use to put wood together?"

Then she displayed a chart with the names of "fasteners" needed and the tool with which to work:

Fastener	*Tool*
Nail	Hammer
Screw	Bit Brace
Dowel	Glue, Clamp

She picked various children to get the different objects and hold them beside the proper word on the chart. Other children were given individual word cards to place appropriately next to the various materials and tools. The teacher stated that the boys enjoyed this activity so much that they did not want to leave when the bell sounded.

These, of course, are the most elementary of techniques, but the boys enjoy them immensely. For our purpose it is significant because the boys were actually engaged in reading, learning word recognition skills, and enjoying the process. A reading ex-

Dr. Ferrerio is principal of the Dewey Junior High School in Brooklyn.

ercise which might be boring or frustrating to them was engaged in with success and enjoyment.

Where these can be achieved — interest, meaning, purpose, satisfaction, and success — the problems of teaching reading to retarded pupils will disappear.

Reading Techniques

The industrial arts area offers unique opportunities for helping retarded pupils learn to read. The many techniques for improving word recognition and comprehension skills can be employed in connection with the industrial arts program:

1. Label objects in the room.
2. Label pictures.
3. Use multiple choice and completion sentences.
4. Carry out directions in simple phrases and sentences.
5. Use riddles based on a tool or a process.
6. Tell the story of a tool.
7. Match illustrations with directions.
8. Make picture dictionaries.
9. Find basic word elements.
10. List words in alphabetical order.
11. Discuss processes and tools.
12. Use film strips with industrial arts vocabulary.
13. Display a large industrial arts vocabulary chart adding new words as they are needed.
14. Use commercial illustrated charts of materials and processes which include easy reading material.
15. Encourage pupils to write out simple directions and processes.
16. Have pupils keep notebooks in which new words are listed as they are acquired, or as new meanings are added to known words. These may be listed alphabetically or grouped under various classifications: cutting tools, hammering tools, electrical tools, etc.
17. Have pupils make up sentences about tools for reading charts— how they sound, how they feel, etc.
18. Make up exercises in which pupils cross out the word that does not belong, e.g., cotton, wool, wood, floor, ceiling, bench, etc.
19. Read and discuss sentences which contain different meanings from the name of a tool, e.g., "Take the bit in one's teeth"; "Put your nose to the grindstone." "Have an ax to grind."
20. List substitute words for "do," "make."
21. Do crossword puzzles including the names of tools.
22. Select family names for groups of materials: pine, oak, walnut (wood); tin, aluminum, iron (metal).
23. Make up a calendar with a word or words learned each day.
24. Make up posters illustrating word meanings.
25. Arouse interest in multiple meanings. Take a simple word such as "sharp," "smooth" and see how many sentences with different meanings the children can make up for a chart.

On Industrial Arts Supervision

RALPH STEEB

- A report on a survey of industrial arts teachers concerning **who supervises** and **whose supervision is valuable.**
- It indicates **almost half of the local personnel who supervise i-a teachers are the least effective** in the latter's opinion.

As an indication of concern of industrial arts teachers for lagging development of supervision by i-a specialists, a recent survey in Pennsylvania reveals that almost half of the local personnel who supervise industrial arts are the least effective in the opinions of 195, randomly selected teachers.

The study showed that the secondary principal is most often the person responsible for supervising the industrial arts program. The district superintendent is the second most frequently mentioned person to supervise industrial arts locally. In a few school districts the curriculum co-ordinator assists these administrators in supervising.

All of the above are general supervisors responsible for the supervision of many departments within a school system. In contrast to special supervisory appointments, such as those in the special areas of art, music, physical education, etc., the training of these administrator-supervisors is usually not related to industrial arts specially. Furthermore, principals often neglect supervision in favor of more routine work — especially when the central administrative office assigns countless, time-consuming clerical details.

This study reveals, however, that principals, superintendents, or curriculum co-ordinators are responsible, either alone or jointly for supervising 46 per cent of the local industrial arts programs. Almost half of the industrial arts programs, therefore, in Pennsylvania are supervised by administrators or curriculum co-ordinators.

Special Supervisors

Vocational directors supervise a greater number of industrial arts programs than do special industrial arts supervisors. In 12 per cent of the school districts the vocational director has full responsibility for the supervision of industrial arts. In another four per cent of the school districts the vocational director shares his supervisory responsibility with the principal.

Special industrial arts supervisors have full responsibility for the supervision of industrial arts in seven per cent of the local programs. Industrial arts department heads have complete responsibility for supervision in six per cent of the school districts. The industrial arts supervisor and the department head jointly carry out the supervisory functions in three per cent of the districts. The special industrial arts supervisors and an ad-

(Concluded on page 56)

Dr. Steeb is an assistant professor of industrial education at the University of Miami at Coral Gables, Fla.

Let's Have Safety—and Sanitation

JAMES A. HALES

From the time a baby is born (and for the duration of his life) he is subjected to the implications of one word —"sanitation." The baby bottle is sterilized; we bathe everyday to stay clean and healthy; dishes are scalded for sanitary purposes; and cities support health departments employing many people whose major aim is to keep the city sanitary and healthy. We use disinfectants, deodorants, and disposable containers, all of which promote our basic philosophy concerning the need for sanitation.

How does this apply to the industrial arts teacher and his laboratory?

This author would hesitate to begin to list all of the publications of any sort which deal with school shop safety. You have but to read of these in most any publication to find that they do not deal with sanitation as a part of safety. Why is there this lack of emphasis on our part with the problems of the dust and dirt of a busy shop, or the sweat of the student's brow and his soiled clothing?

It is the purpose of this report to emphasize that one word, "sanitation," with respect not to our entire facilities, but rather to a small part of our laboratories. Around every welding area are found goggles and helmets for eye protection against harmful light; but why place sweat-laden and bacteria-ridden paddings around one's eyes?

Day after day, every period of the day, students wear this equipment and because of the heat radiated from welding operations, their entire body perspires, including those portions of the head upon which the goggles or helmet rest. In due time the leather or rubber padding around these protective devices begins to deteriorate and it becomes a very unpleasant thing to place on your forehead and over your eyes. It is only common sense to realize that bacteria thrive on this rotten material, and still we use them with the possibility of infecting students with disease.

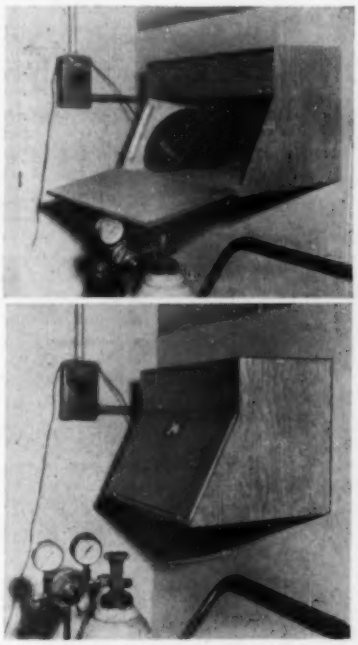
One solution to the whole problem would be to have each student purchase his own welding goggles and helmet for his personal use. This still wouldn't keep the equipment sanitary and this author's guess is that for the most part students would be unable to own this equipment for numerous economic reasons. This leaves no alternative except for the school to purchase them for the use of all the young welders and at the same time accept the responsibility of keeping the equipment sanitary.

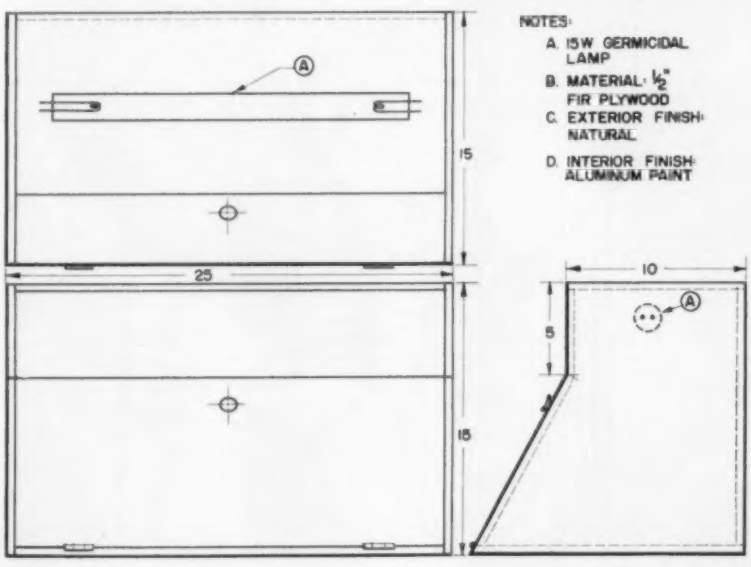
Mr. Hales is instructor of metals at the Solon High School, Solon, Ohio.

Goggle Sanitary Device

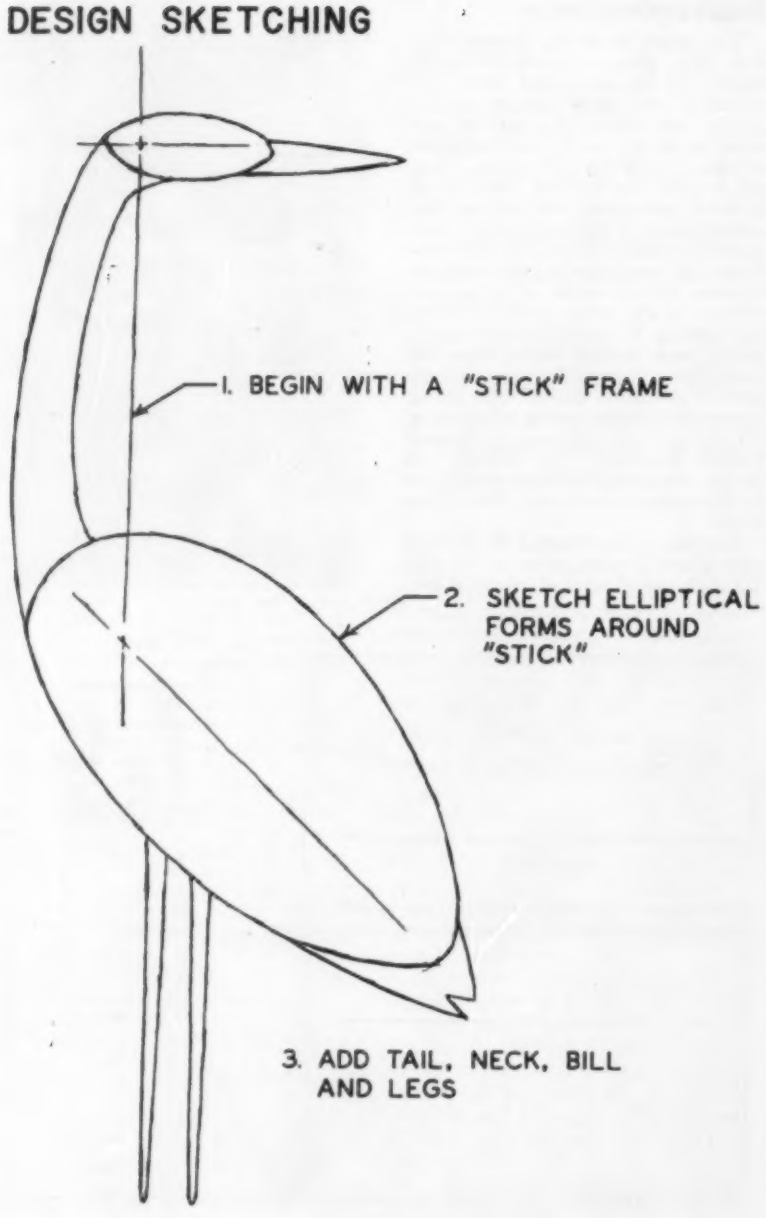
This author is of the opinion that, with little effort, a relatively simple device can be constructed which will efficiently and easily sanitize welding goggles and helmets. Any type of container or device can be constructed to contain a 15-watt germicidal lamp which must be shielded from direct view. A one-minute exposure of the affected areas of the equipment is sufficient to eliminate all bacteria and deodorize the padding material. A longer exposure will also serve the purpose of drying out the sweat contained within the padding. If a box is constructed, it should have a door to eliminate the possibility of viewing the lamp, and the interior should be painted with aluminum paint for the purpose of reflecting the light to all surfaces. A standard 15-watt fluorescent lamp channel will receive the germicidal lamp and it can be connected in a standard 115-v–120-v outlet.

Sanitation safety around the welding area is only a minor portion of the part it can play in all areas of industrial arts. Be aware of safety against injury but don't overlook bacteria and the resulting diseases.





Design Ideas for the Handicrafts



Industrial arts teachers are always searching for new ideas to expand and enrich their course offerings. In the crafts area, where perhaps too much work is of a teacher-directed nature, ideas which offer opportunities for individual design experiences are especially welcome.

An example of the above is the design and construction of wall plaques. Built primarily of metal and wood, they lend themselves nicely to the crafts area because they provide interesting and challenging design experiences for students, and are relatively easy to construct. The only requirements for their successful completion are the willingness to practice and experiment with their design and materials, and the mastery of a few basic hand skills.

Design Sketching

One way to begin this activity is to secure an animal or bird picture book and scan it for ideas. The reason for doing this is not to copy but to be provided with a source of stimulation.

If we assume that the heron is selected as the subject to be developed, we sketch the heron in several positions, very roughly, for it will be refined later. A good way to start is to employ the "stick" drawing technique, as shown in the sketch, and then add the elliptical shapes to form the head and body. The neck, bill, tail, and legs are next sketched in to complete the drawing. Remember that the keyword here is simplicity; simplicity demands the exclusion of any details which do not contribute to a graceful, clean appearance. This means that details

DESIGN for the TEACHER

john r. lindbeck

Assistant Professor of Industrial Education, Western Michigan University, Kalamazoo, Mich.

▶ Here is the second in a series of articles on how to apply the **principles of good design** to various instructional areas.

▶ The first, in your IA/VE for January, was concerned with metalwork. The second is on "crafts."

such as tail and neck feathers can be eliminated.

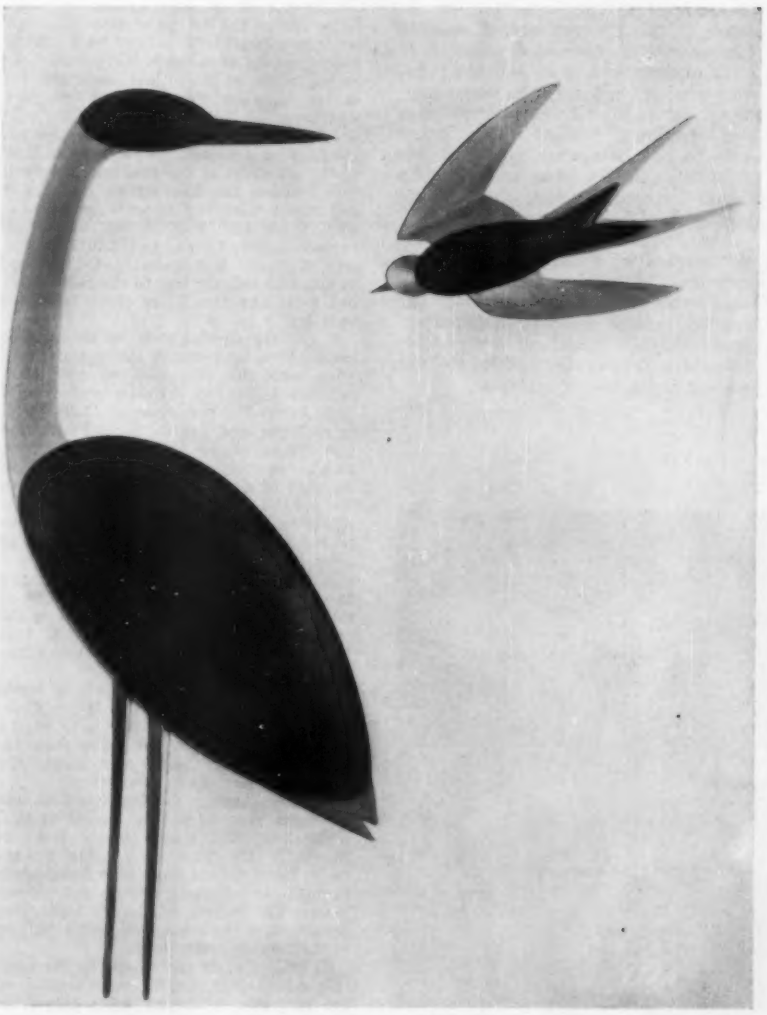
Now compare this to the picture in the book; does it look anything like a heron? Though an exact likeness is not necessary, a few alterations may be in order. Change the shape or position of some of the elements; cause them to flow gracefully into one another by avoiding sharp breaks in the line work. Finishing touches such as these give the work a more refined and sophisticated appearance. Through patience and practice, the ease with which the design can be made will become evident.

Production of the Piece

When the planning and sketching are completed, the wood and metal must be selected for the project. Such constrasting combinations as teak and aluminum or German silver, walnut and brass, or mahogany and aluminum make attractive pieces. Try to choose wood whose grain conforms somewhat to the shape of the pattern, as illustrated in the photograph.

The patterns are traced on the wood and metal and cut out. With knives or chisels the wooden portions are carved and shaped; a good sanding and coats of linseed oil and wax complete these. The metal edges are filed smooth and these parts are then finished with steel wool or aluminum oxide paper to give a brushed or satin appearance, and lacquered. The student who may wish to give the metal a high polish instead, will use the buffers and compounds.

The pieces are easily assembled with contact cement or wood screws, and a hanging device is fastened at the balance point. ◀



AN $8 CRUCIBLE FURNACE

CHARLES G. RISHER

Assistant Professor of Industrial Education
Western Michigan University, Kalamazoo

The crucible furnace described in the following paragraphs was planned to provide an inexpensive and effective piece of equipment for the foundry area of a general industrial arts laboratory. The furnace has met both these expectations. The total cost of materials for the furnace was $8. Starting with the furnace cold, brass and bronze have been melted and poured 25 minutes after igniting the furnace, and the melting and pouring time for aluminum has been markedly less.

During its construction, the thought occurred to the writer that the furnace could fulfill a vastly more important function than as an item of foundry equipment. Its low cost and simplicity of construction have placed it within the financial and constructive ability ranges of advanced industrial arts students.

Too frequently, industrial arts students receive instruction in areas involving expensive and specialized equipment available to them only in the industrial arts laboratory. Under these conditions there can be little, if any, out-of-school application of such instruction due to the inaccesability of the equipment. The foundry is an example of this circumstance. A crucible furnace such as the one described here can be constructed as an individual student project, and serve as the equipment nucleus for a home situated brass and aluminum foundry. This would seem to be a somewhat more desirable at-home application of an area of public school instruction rather than casting lead soldiers and fishing weights.

The castable refractory cement for the furnace is usually available from commercial foundries, or firms specializing in boiler setting and repairing. The crucible furnace described required approximately 80 pounds of dry castable refractory cement in addition to the accompanying bill of materials.

Steps in Fabrication

After securing the discarded 30 gallon hot water tank, the crucible furnace was fabricated in the following steps:

1. Saw a 12 in. long section from the upper end of the hot water tank. This can be accomplished with a hand hack saw in approximately 45 minutes. Remove any attached pipes or tubes, and allow the resulting holes to remain open. This part will be called the furnace jacket.

2. Cut three legs as shown in the accompanying drawings, and locate and drill ¼-in. bolt holes at the positions indicated.

3. Position the legs vertically and 120 deg. apart with the upper edge of each slanting cut flush with the top edge of the furnace jacket. Locate and drill matching sets of ¼-in. bolt holes in the furnace jacket, and bolt the legs to the jacket with one 2-in. and two ¾-in. stove bolts for each leg.

4. Cut the circular ends for the furnace cavity form and attach the outside covering with the wire nails to produce a cylinder 7½ in. in diameter and 8¾ in. high. Fasten the two pieces of ⅜ by ⅜-in. in diameter and 8¾ in. high. Fasten the two pieces of ⅜ by ⅜-in. angle iron parallel to each other and 4 in. apart to one end of the furnace cavity form with the 4 RHB ¾ in. by No. 6 wood screws. Allow an equal length of the angle irons to overhang each side of the furnace cavity form.

5. Locate a point midway between any two legs and 8 in. below the top edge of the furnace jacket. With this point as the center, cut a horizontally elliptical hole 1⅝ by 2 in. in the furnace jacket to admit the air input pipe.

6. Lower the furnace cavity form inside the furnace jacket until the ⅜ by ⅜-in. angle irons rest on the top edge of the furnace jacket. Center the cavity form inside the furnace jacket and clamp the angle irons securely in place.

7. After shaping the inner end of the air input pipe to fit the curved vertical surface of the furnace cavity form as shown in the plan of crucible furnace body, insert the air input pipe horizontally through the elliptical hole in the furnace jacket. The bottom of the air input pipe should be at the same level as the bottom of the furnace cavity form.

8. With the air input pipe in the position described in step 7, locate a point on the long side of the air input pipe 2 in. outside the furnace jacket. Remove the air input pipe from the elliptical hole in the furnace jacket, and with the located point as the center, cut a horizontally elliptical hole ¾ by 1¼ in. in the air input pipe to admit the gas input pipe.

9. Thread one end of the gas input pipe and cut the other end at 45 deg. Insert the 45-deg. end in the elliptical hole in the side of the air input pipe as shown in the plan of crucible furnace body. Weld the two pipe sections together. The gas input pipe must be threaded prior to welding, in that there is not sufficient clearance for the threading after welding. This positioning of the gas input pipe decreases the possibility of the gas flowing into the blower during the igniting procedure. To minimize air turbulence, the 45-deg. end of the gas input pipe should not extend beyond the inside wall of the air input pipe.

10. Insert the air input pipe with the gas input pipe welded in place, through the elliptical hole in the furnace jacket. Position as described in step 7, and as shown in the plan of crucible furnace body. Weld this air-gas input assembly to the furnace jacket,* and remove the furnace cavity form.

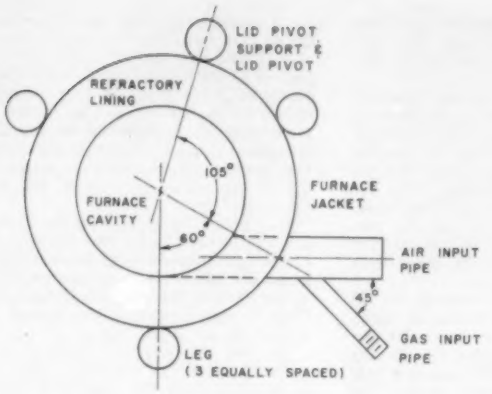
11. Cut the lid pivot support as shown in the accompanying drawings, and locate and drill ¼-in. bolt holds at the positions indicated.

12. Position the lid pivot support vertically with the square cut end flush with the top edge of the furnace jacket, at a position 105 deg. counter clockwise from the center of the air input pipe. Locate and drill a matching set of ¼-in. bolt holes in the furnace jacket, and bolt the lid pivot support to the furnace jacket with one 2-in. and two ¾-in. stove bolts.

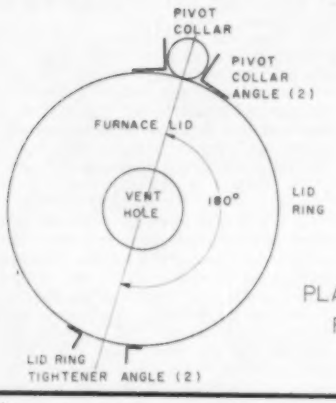
13. Cut, drill and tap the lid pivot as shown in the accompanying drawings. Insert the lid pivot in the upper end of the lid pivot support, and secure in place with the ½ in. long stove bolt.

14. Saw a 2-in. long section from the hot water tank. This part will be called the lid ring.

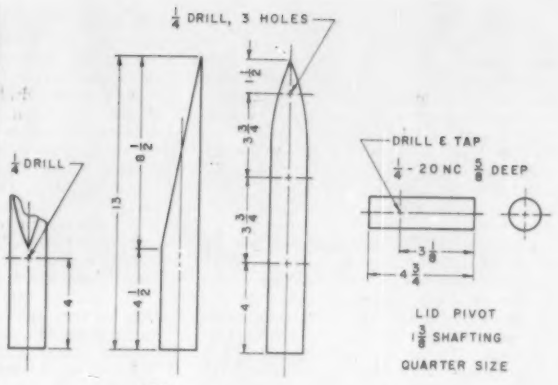
*The two welds described are the only welds necessary to construct the furnace. Although all pieces bolted in place might have been welded, the furnace was specifically designed to facilitate construction in schools where no welding facilities are available. To implement furnace construction in such schools, contacting a local metal fabricating or repair establishment will usually result in cost-of-materials welding, if for school purposes.

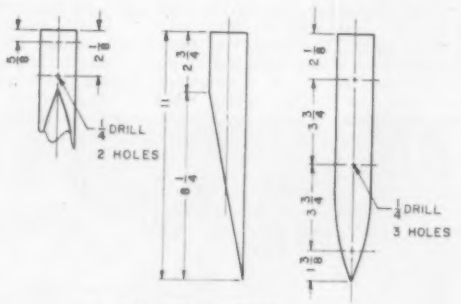


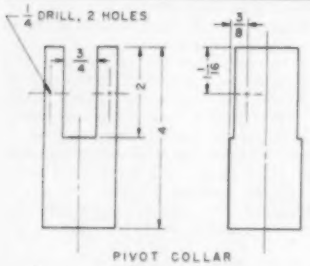
PLAN OF CRUCIBLE FURNACE BODY

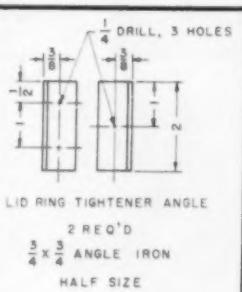


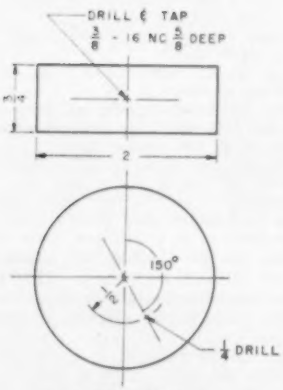
PLAN OF CRUCIBLE FURNACE LID

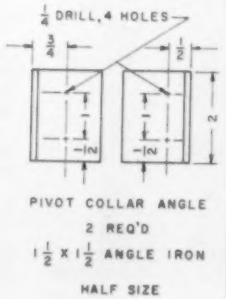


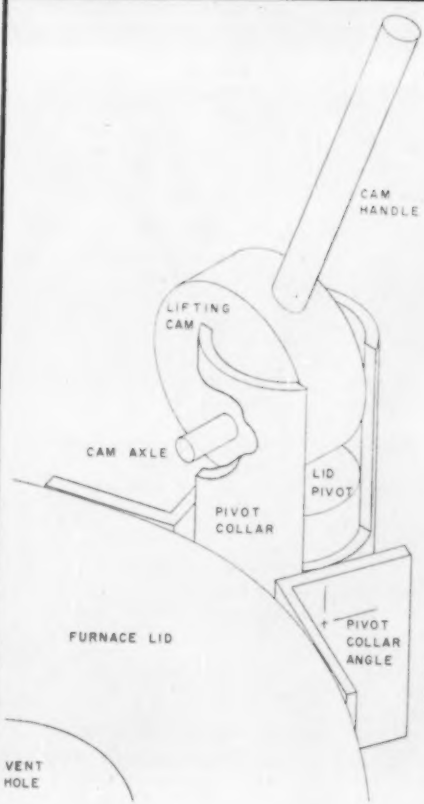












CRUCIBLE FURNACE LID LIFTING MECHANISM

15. Cut and drill the pivot collar and the pivot collar angles as shown in the accompanying drawings.

16. Place the lid ring, the pivot collar and the pivot collar angles on a flat surface and assemble as shown in the plan of crucible furnace lid. Locate and drill in the lid ring ¼-in. bolt holes which will align with the ¼-in. bolt holes in the pivot collar angles, and bolt the pivot collar angles to the lid ring with four ¾-in. stove bolts.

17. Place the lid ring assembly on the upper edge of the furnace jacket, with the lid pivot midway between the pivot collar angles. Place the pivot collar on the lid pivot, and rotate the pivot collar until the sides of the cut slot are parallel to the center line of the air input pipe.

18. Locate, drill, and tap four ¼ in. 20 NC holes in the pivot collar which will align with the remaining holes in the lid pivot collar angles. Attach the lid pivot collar to the pivot collar angles with ½ in. long stove bolts. The ends of the stove bolts extending through the pivot collar should be filed flush with the inner wall of the pivot collar. Positioning the pivot collar as described allows the hand of the furnace operator to remain a maximum distance from the furnace cavity when opening and closing the furnace lid.

19. Drill and tap the lifting cam as shown in the accompanying drawings, and insert the correspondingly threaded end of the cam handle. Center drill one end of the insulating handle 2 in. deep with an 11/32-in. drill, and insert the unthreaded end of the cam handle. Assemble the lifting cam and the pivot collar with the cam axle as shown in crucible furnace lid lifting mechanism.

20. Cut and drill the lid ring tightener angles as shown in the accompanying drawings. Position the lid ring tightener angles as shown in the plan of crucible furnace lid, two inches apart, one inch on each side of a mark 180 deg. from the pivot collar. Locate and drill four ¼-in. bolt holes which will align with the two pairs of ¼-in. bolt holes in the lid ring tightener angles, and bolt in place with four ¾-in. stove bolts.

21. Cut out the 2-in. section of the lid ring between the lid ring tightener angles and replace this cut out portion with the wooden spacer, after inserting the lid ring tightener screw through the remaining hole in each lid ring tightener angle. The wooden spacer should be placed between the cut ends of the lid ring, rather than between the outer edges of the lid ring tightener angles.

22. Place the complete furnace lid assembly in position on the furnace jacket, with the lifting cam resting on the lid pivot. Tighten the lid ring tightener screw, with the wooden spacer in place, until the shape of the lid ring is the same as that of the furnace jacket. Depressing the cam handle will cause the entire lid assembly to be raised above the furnace jacket, and allow it to be swung freely on the lid pivot.

23. Lift the lid assembly from the furnace jacket. Remove the lid pivot from the furnace body, and the cam axle and lifting cam from the furnace lid assembly.

24. Cover the two circular holes in the bottom of the furnace jacket with the two pieces of 2 by 2 in. 20-gauge aluminum dished to fit the holes. The dishing prevents their being displaced by the plastic refractory cement. Covering the holes in this manner allows water to drain from the plastic refractory cement and speeds the curing time.

25. Center the furnace cavity form inside the furnace jacket and securely clamp and weight in position to prevent displacement by the refractory cement. Check to be certain the side of furnace cavity form is tightly against the curved inner end of the air input pipe.

26. Mix the refractory cement in accordance with the manufacturer's directions printed on the containing bag. Fill the space between the furnace cavity form and the furnace jacket with the plastic refractory cement, rod to prevent bubbles of trapped air, and trowel the top surface smooth.

27. Place the lid ring on a clean piece of galvanized iron at least 15 in. square, and center the furnace lid vent hole form inside the lid ring, and weight in place. Fill the space between the lid ring and the lid ring vent hole form with plastic refractory cement, and trowel the top surface smooth. The thickness of the refractory lid will be ¾ in. thicker at the edges of the vent hole than at the surrounding lid ring.

28. Check the refractory cement in the main furnace body six hours after initial casting, for any settling of the refractory. Settling is usually caused by excessive mixing water, and occurs when the water drains out the holes in the bottom of the jacket. Some water will usually drain through the air input pipe, also. Should settling occur, mix a small amount of fresh refractory cement, fill any sunken areas, and trowel smooth.

29. Remove the furnace cavity form 48 hours after the final troweling of refractory cement. In most cases the cavity form will require complete destruction to remove it.

30. Remove any refractory cement which might have flowed inside the air input pipe. Removal of the refractory cement at this time is far easier than after complete curing.

31. Lift the furnace lid from the square of galvanized iron, and place on one edge to speed the curing of the refractory cement.

32. Clean all metal parts (except the lid pivot and lifting cam) and paint with two coats of heat resistant aluminum paint.

33. Reassemble the crucible furnace.

34. Connect a blower with an air volume control to the air input pipe.

35. Connect a controllable gas supply to the gas input pipe.

36. Close the air valve on the blower and start the motor.

37. Open the furnace cavity by swinging the lid to expose it, and place a burning wand in the furnace cavity.

38. Open the gas supply until the flame burns above the top of the furnace.

39. Gradually open the air valve on the blower and adjust until the flame becomes neutral.

40. Swing the lid to cover the furnace cavity.

41. To shut down the furnace, close the gas supply then switch off the blower motor.

CAUTION: *Never* attempt to ignite the furnace with the cover in place over the furnace cavity. Doing this may cause an explosion inside the furnace cavity, which will violently hurl the furnace lid from the furnace body.

Bill of Materials

Quan.	*Part*	*Material*
		Main Furnace Body
1	Furnace Jacket	12″ long section of 30 gallon hot water tank
3	Legs	1¼″ pipes 13″ long
1	Lid Pivot Support	1¼″ pipe 11″ long
1	Lid Pivot	1⅜″ shafting 5″ long
1	Air Input Pipe	1¼″ pipe 10″ long
1	Gas Input Pipe	¾″ pipe 5″ long
4	Fasteners	stove bolts ¼″ — 20 NC 2″ (lock washers & nuts)
8	Fasteners	stove bolts ¼″ — 20 NC ¾″ (lock washers & nuts)
1	Fasteners	stove bolt ¼″ — 20 NC ½″
2	Hole Covers	20 gauge aluminum 2″ x 2″
		Furnace Lid
1	Lid Ring	2″ section of 30 gallon hot water tank
1	Pivot Collar	1¼″ pipe 4″ long
2	Pivot Collar Angles	angle irons 1½″ x 1½″ x 2″
1	Lifting Cam	2″ shafting ¾″ long
1	Cam Handle	⅜″ steel rod 8″ long
1	Cam Axle	¼″ steel rod 2″ long
1	Insulating Handle	1″ birch dowel 4½″ long
2	Lid Ring Tightener Angles	angle irons ¾″ x ¾″ x 2″
1	Lid Ring Tightener Screw	hexagon head machine screw ¼″ — 20 NC — 2½″ (lock washer & nut)
1	Wooden Spacer	hardwood ½″ x 2″ x 2″
8	Fasteners	stove bolts ¼″ — 20 NC ¾″ (lock washers & nuts)
4	Fasteners	stove bolts ¼″ — 20 NC ½″
		Furnace Cavity Form
2	Circular Ends	soft wood ¾″ x 7½″ dia.
1	Outside Covering	galvanized iron 8¾″ x 28″
2	Cavity Form Supports	angle irons ⅜″ x ⅜″ x 12″
4	Fasteners	RHB wood screws ¾″ x #6
24	Fasteners	wire nails ½″ x #20
		Furnace Lid Vent Hole Form
1		3½″ O. D. pipe 2¾″ long

AN EXECUTIVE NAME PLATE

MICHAEL C. PIERNO and LAWRENCE A. ROGERS

Metal Shop Instructors, Derby Junior High School
Birmingham, Mich.

In the foundry area of our shop we have one of the old stand-by projects, the name plate. It is the type that requires pattern letters mounted on a back pattern. Recently, a student working in the foundry area asked if it would be possible to have a desk name plate that would have only the letters standing on a base, forming a silhouette of the name. The student was informed that we did not have facilities available to make such a project in our shop, but we discussed and considered the possibilities of making such a project feasible, and decided on the following procedures:

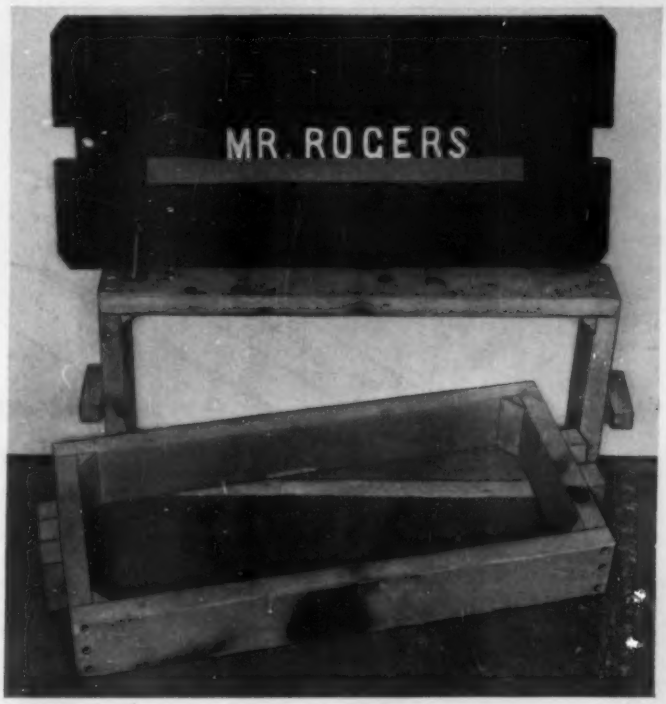
In selecting a suitable shape for a base that could be used as a split pattern, a trapezoid seemed to be the best choice. The dimensions of the base pattern are as follows: the bottom base is 1¾ in. wide, the top base is ½ in. wide, the height of the trapezoid is 1¼ in. and the total length of the base is 18 in. The long base pattern makes it possible to use the same pattern for nearly all names, regardless of the number of letters required. All draft allowances for the base pattern are figured according to patternmaker's standards.

The base pattern is mounted on a plate made of 16-gauge steel. This plate is designed to fit between the drag and cope of a flask that is expressly designed for this project. The over-all dimensions of this flask are: 25 in. long, 8 in. wide, and 6 in. deep. It is our belief that a flask of this size, which is made of ¾-in. wood, is considerably lighter than the standard steel flask and more suitable for students in junior high school.

The pattern letters used in molding this project are held to the pattern plate with shellac and should be allowed to dry 24 hours before being used. To begin the molding, place the pattern plate with the letters face down between the drag and cope. We find when molding a pattern mounted on a plate, it is more suitable to start by ramming the flask, drag up, first. After the drag is rammed the flask is then rolled, cope up; the sprue and riser are placed, one at each end of the base pattern, and the cope is then rammed. The sprue pins should have a minimum diameter of 1¾ in. to minimize shrinkage.

To remove the pattern plate from the mold, lift the cope, making certain that the pattern plate is held securely to the drag. To remove the plate, lift straight up from the drag. The mold is now ready to be gated. When gating the mold it is imperative to gate the bottom of each letter into the base. This will enable the flowing metal to fill each letter.

After the mold has been poured and ample time allowed for cooling, cut the excess portions on each end of the base, forming angles that are equal to those of the sides. Clean and file the entire project. Apply two coats of flat black enamel and allow each coat sufficient time for drying. The faces of the letters are then finished with a mill smooth file and polished with fine emery cloth. The bottom of the base should be covered with felt or a similar material to prevent marring the desk's surface.



PNEUMATIC CLAMPING OF LAMINATED WATER SKIS

CHRISTIAN J. HANSEN
Altadena, California

The laminated water ski featured in this article utilizes the principle of pneumatic clamping. The form shown may be used to produce other laminated products as well. It was designed to facilitate clamping of double or single slalom water skis and also snow skis. A ski built to these specifications is strong enough to be supported at both ends and to have a 200 lb. man bounce and spring on it at the center.

Constructing the Form

The form is constructed of ¾-in. Douglas fir plywood, much like a concrete form. Care should be taken so as not to decrease the strength of the form since it must resist a force of more than 10 tons. Pneumatic clamping is accomplished by taking a 6.50 x 15, or larger, tire inner tube, cutting it 6 in. from the valve stem and clamping each end with two pieces of ¾ by ¾ by 8¾ in. steel bolted together as shown in the drawing and filling it with air.

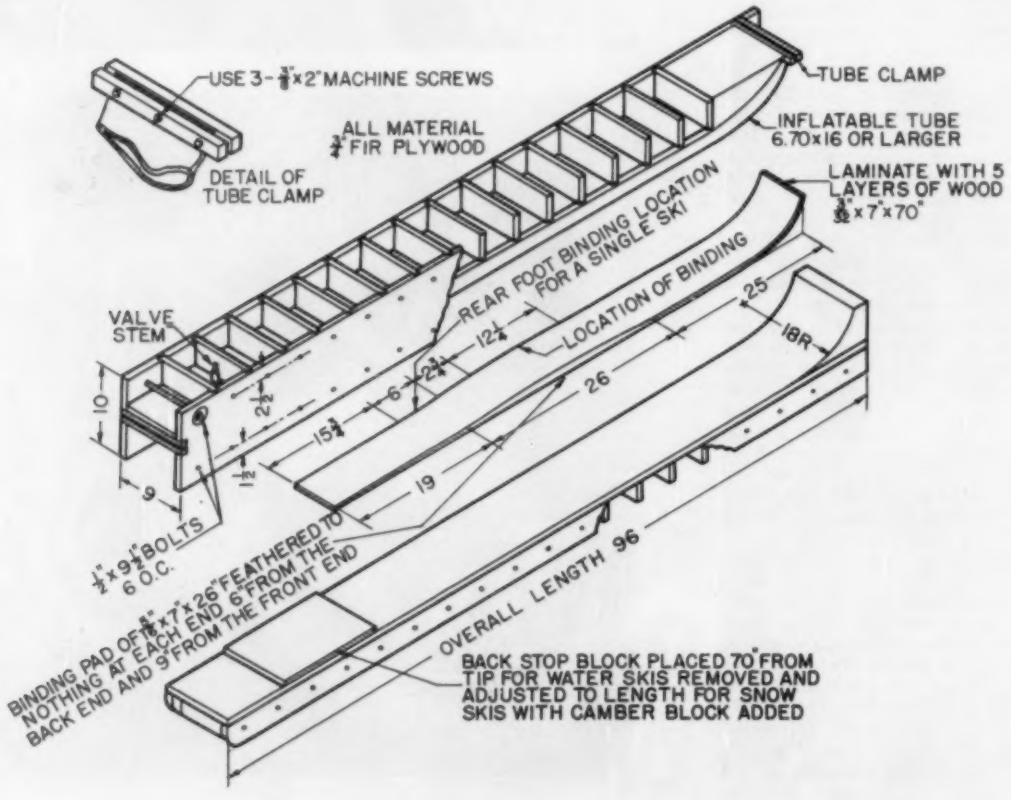
The ski material may be obtained by buying ready-cut fletches or by sawing and planning.

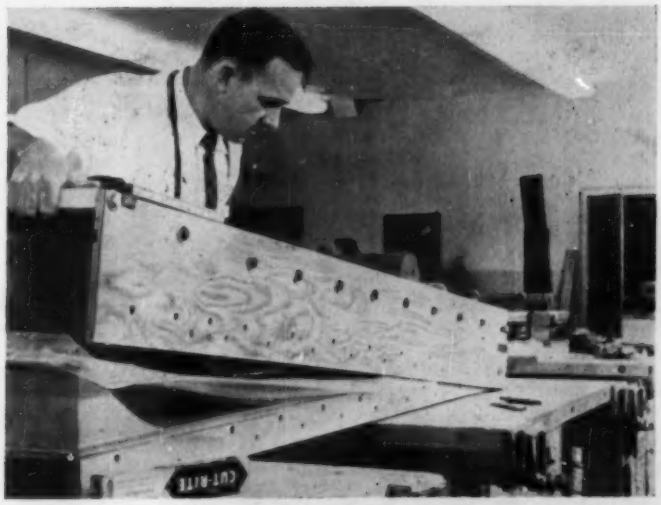
The Making, Veneer Pieces

To "make your own," obtain five pieces of mahogany, domestic ash, or Sitka spruce 3/32 by 6 or 7 in. by 70 in. and one piece 5/16 by 6 or 7 in. by 26 in. long (6 in. for doubles and 7 in. for singles). Plane fletches by placing each on a thicker and larger piece of surfaced lumber, running with the grain to prevent splitting out. Taper the footpad 6 in. from one end and 9 in. from the other. Complete the tapering by hand. Don't try to feather out to a sharp edge on the jointer; always complete feathering by hand.

Gluing and Forming

After having first tested your form under pressure you are ready for gluing


USE 3-⅜"x2" MACHINE SCREWS
DETAIL OF TUBE CLAMP
ALL MATERIAL ¾" FIR PLYWOOD
TUBE CLAMP
INFLATABLE TUBE 6.70x16 OR LARGER
LAMINATE WITH 5 LAYERS OF WOOD 3/32"x7"x70"
REAR FOOT BINDING LOCATION FOR A SINGLE SKI
LOCATION OF BINDING
VALVE STEM
10
2½
15¾
6
2¾
12¼
25
18R
26
19
9
½
½"x9½" BOLTS 6 O.C.
BINDING PAD OF ⅛"x7"x26" FEATHERED TO NOTHING AT EACH END 6" FROM THE BACK END AND 9" FROM THE FRONT END
OVERALL LENGTH 96
BACK STOP BLOCK PLACED 70" FROM TIP FOR WATER SKIS REMOVED AND ADJUSTED TO LENGTH FOR SNOW SKIS WITH CAMBER BLOCK ADDED



Above: applying glue to the fletches with a paint roller or a serrated spreader. Above, right: enclosing glued fletches in the form; note the waxed paper wrapping. Below: bolting up the form. Right: applying air pressure to 30 lb. per square inch; use either a compressor or a hand operated air pump.

the fletches. Using a plastic resin urea-formaldehyde type waterproof glue and a 6 in. paint roller or a serrated spreader to apply it, place the bottom fletch on a strip of waxed paper and coat its top surface with glue. Lay the second fletch on, coat it with glue; repeat this operation on fletches three and four. The footpad is placed 19 in. from the back of the ski blank with the 6 in. taper to the back.

Glue is then applied to its upper surface. Place the top fletch on and wrap the entire ski with a second sheet of waxed paper. The whole assembly is then placed in the form. The form is assembled and filled with air to 30 lb. per square inch. The glue is allowed to set for eight hours or longer before the pressure is released and the ski blank is removed from the form.

Finishing the Ski Blank

Scrape the excess glue from the edge of the ski blank to facilitate jointing. Next rip the opposite edge parallel and to the desired width, 6¾ in. for a single and 5¾ in. for pairs. Lay out the ski tip and banana shape if desired and saw.

For a finish use a filler on open grain woods followed by a coat of sealer and three coats of a good marine varnish. Some craftsmen will prefer Fiberglasing. The last step is attaching the binding and fin. This hardware may be obtained from most stores selling water skis.

COLONIAL NIGHT TABLE

R. SWINYARD
Ichabod Crane Central School
Valatie, New York

This project utilizes most of the power equipment in the average woodshop, and has proven popular with both high school and adult education classes. The instructor will cover a great many machine operations in demonstrating the construction of this project, and many related lessons regarding wood selection, machine safety, joints, abrasives, adhesives, wood screws, and wood finishing. The circular saw is used for crosscutting, ripping, dadoing, grooving, and rabbeting. Edges are trued on a jointer. The curved parts of the sides and apron are cut on the jigsaw or band saw. Holes in the top are drilled and counterbored on the drill press, and the drawer pull is made on the band saw. Belt or orbital sanders may be used to speed the sanding operation.

The original night table was made of cherry with a linseed oil finish, but maple or pine with a suitable stain may also be used. It was designed to harmonize with colonial bedroom furniture.

Construction of the Table

1. Get stock for sides and cut to size on circular saw, allowing about 1/16 in. extra in width for jointing edges. Do not joint edges at this time.

2. Plane both faces of each side lightly to remove planer marks, but do not sand smooth.

3. Set up the dado head on the saw for a width of 3/4 in., and adjust the cut for a depth of 1/4 in. Test width and depth of cut on a piece of scrap wood, and make any corrections necessary.

4. Locate position of dado cuts on side members as shown on the drawing, 4 1/4 in. from top of side, and 6 1/4 in. from bottom of side. Cut both dados, feeding the stock slowly to minimize splintering of the edge as the cut is finished.

5. Joint edges to finished width, and remove any splintering of the edges which might have occurred while cutting the dado joints.

6. Using 1/2 in. graph paper, enlarge the design at the bottom of the sides as shown on the drawing and transfer it to the side members. Saw out the design, using the jigsaw or band saw. If the band saw is used both pieces may be cut at once by clamping them together.

7. With a spokeshave or file shape the front edges of the sides to show wear, as indicated on the drawing.

8. Carefully sand all surfaces of both side members, except the top end and dado cuts.

9. Select stock and cut both shelves to size on circular saw. Again allow about 1/16 in. extra in width for jointing edges. Joint edges of both shelves.

10. Plane both sides of each shelf lightly to remove planer marks.

11. Select the lower shelf, and with a spokeshave or file shape the top of one edge to show wear.

12. Carefully sand the faces and edges of both shelves. Do not sand the ends. Make a trial assembly of sides and shelves.

Bill of Materials

Quan.	*Material*	*Size*
2	Sides	3/4" x 9 1/2" x 27 1/4"
2	Shelves	3/4" x 9 1/2" x 13"
1	Apron	3/4" x 2 1/2" x 13 1/4"
1	Top	3/4" x 10 1/2" x 16"
1	Drawer front	3/4" x 4 9/16" x 13 1/4"
2	Drawer sides	1/2" x 4 3/16" x 9 1/2"
1	Drawer back	1/2" x 3 7/16" x 11 15/16"
1	Drawer bottom	1/4" plywood 9 3/8" x 11 15/16"
1	Drawer handle	3/4" x 1 1/4" x 5"
4	Glue blocks for apron	3/4" x 3/4" x 1 1/2"
6	Wood screws (flat head)	No. 8 1 1/4"
	Finishing materials — depending on the wood chosen	
	Glue	

13. Assemble and glue both shelves into the two side members. Clamp the assembly with bar clamps, being careful to protect the sanded surfaces of the sides from being marred by the clamps. Use small blocks with sanded surfaces between the clamps and the wood. Four bar clamps are used. Check the angle between the sides and the shelves with a square, and make any necessary clamp adjustments.

14. While the assembly is drying, select and cut the stock for the apron which fits just under the lower shelf. A ⅜ by ⅜ in. rabbet is cut along one edge and both ends on one side of the apron. This is cut with the dado head on the circular saw. Plane faces and edges to remove machine marks.

15. Using ½ in. graph paper, enlarge the design of the apron as shown on the front view of the drawing, and transfer it to the apron. Saw out the design using the jigsaw or band saw. Round the edges on the top and two ends of the face with a file. Sand all surfaces smooth.

16. After the assembly (step 13) is dry, the apron is glued and clamped in place below the lower shelf. Although the rabbet joint on the apron provides a large gluing surface, it is advisable to glue in the four small glue blocks for added strength. One is glued below the shelf at each end of the apron, and two in the center.

17. Select stock for the top and cut to size, allowing extra width as before for jointing the edges. Joint both edges to finished width and plane top lightly on both sides to remove machine marks. Place top on the sides so that it is flush with the back of the table. This will allow an overhang on the front and two sides of one inch.

18. Locate the position of the four holes to be drilled through the top while it is in position. Two holes are located 2 in. from the back edge of the top, and directly over the side members, and the other two holes are located 3 in. from the front edge of the top and directly over the side members.

19. On the drill press, drill the four holes through the top piece to accommodate the No. 8 wood screws. Counterbore these four holes with a ⅜ in. drill to a depth of ⅜ in. on the top side of the top only.

20. Shape top to show wear with a spokeshave or file, as indicated on the drawing. Note the back edge of the top is not shaped. Carefully sand all surfaces, breaking sharp corners.

21. Again position the top on the sides so that it is flush with the back and the overhang is 1 in. on the sides and front. Through the holes drilled in the top, mark the position of the pilot holes in the ends of the side members. Remove the top and drill the pilot holes into the ends of the sides.

22. Place a thin layer of glue on the ends of the side members and fasten the top securely with the four No. 8 1¼ in. flat head screws. Cut four ⅜ in. diameter wood plugs about 7/16 in. long from the same type of wood as the top, and glue these into the four counterbored holes. After the glue is hardened, sand these plugs down even with the surface of the top.

23. Cut drawer front to size. Cut ⅜ by ⅜ in. rabbet along one edge, and ⅜ by ⅜ in. rabbet along the ends, on one side of the front. On the same face that the rabbets are cut, cut a ¼ by ¼ in. groove 3 7/16 in. from the top edge for the drawer bottom to fit into. Plane surfaces and round the two ends and bottom edge of the front. Sand all surfaces.

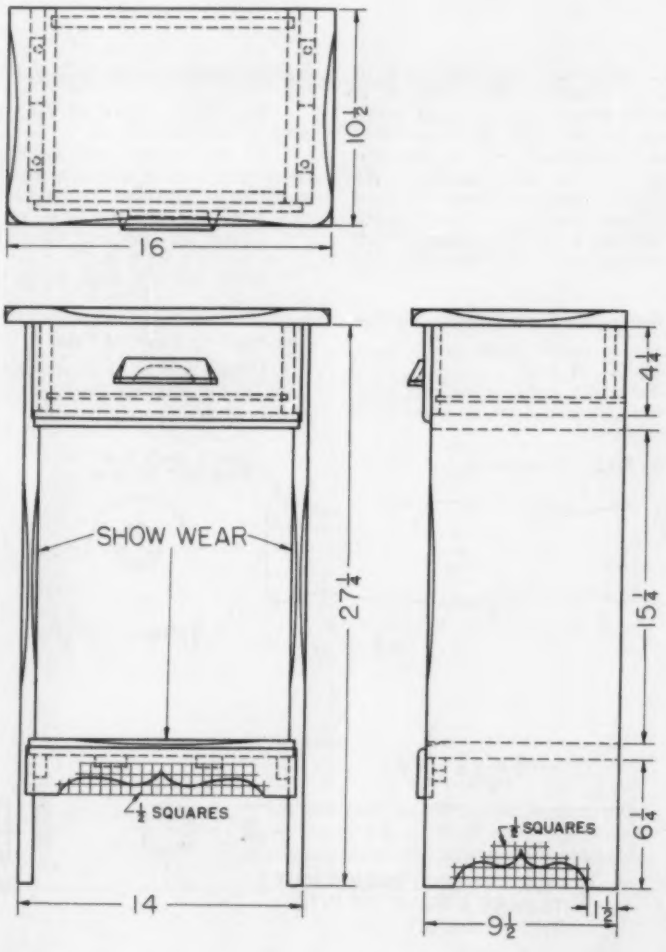
24. Cut the two drawer sides to size and joint edges. Cut a ¼ by ¼ in. groove 3 7/16 in. from the top edge for the drawer bottom to fit into. Cut a dado ¼ in. deep and ½ in. wide ½ in. in from the inside end of each side, and on the same surface as the grooves for the bottom. This dado accommodates the drawer back. Cut the drawer back, and the drawer bottom to size.

25. Assemble the drawer with glue and brads. Fasten the two drawer sides to the drawer front, slip the drawer bottom into place, and fasten the drawer back to the sides, and the bottom to the back. Check construction with square.

26. Tilt the table of the band saw 20 deg., and cut the finger groove on the back of the drawer pull. This groove is only 3 in. long. With the table at the same angle, cut the front of the drawer pull along its entire length, leaving ¼ in. at the top edge showing along its length, and ¼ in. at the bottom face showing along its length. The two ends of the pull are cut at the same angle (20 deg.). This is shown in the drawing. Sand the pull on all surfaces to remove cutting marks.

27. Using the remaining two No. 8 1¼ in. wood screws, the drawer pull is now to be fastened to the center of the drawer front. Now countersink the inside of the drawer front for the screw heads.

28. Apply the finish of your choice to the table. If the table is to be stained evenly, it will be necessary to apply a thin coat of linseed oil to the end grain, to prevent it from turning darker by absorbing more of the stain.



Bill of Materials

Quan.	*Material*	*Size*
1	copper	¾" D. x 2⅜"
1	thin wall conduit	½" size x 3¾"
1	tubing (metal)	⅝" O.D. x 4½"
1	hardwood stock	1½" square x 6" long
1	100-watt heating element	½" x 4"
1	attachment plug	
4 ft.	asbestos heater cord	
1	set screw (size optional)	

100-WATT SOLDERING COPPER

J. RUSSELL KRUPPA
Bald Eagle Nittany Area Joint Schools
Mill Hall, Pa.

This soldering copper will work in nicely as a general shop project. It covers the areas of woodworking, metalworking, and electricity. By using tubing we have eliminated a lot of time-consuming work on the metal lathe. We use 100-watt heating elements which can be purchased from commercial sources. We feel that these units operate much more satisfactorily than those wound by hand.

The Procedure for the Soldering Tip

1. Obtain copper stock ¾ in. diameter by 2⅜ in. long.
2. Face both ends on machine lathe.
3. Set compound rest on lathe at 70 deg. and turn tip back ⅝ in. from one end.
4. File either a two or four sided point on the soldering tip.
5. On the opposite end, machine an offset ½ in. long to approximately ⅝ in. in diameter. This diameter should provide a drive fit into the ½ in. conduit.
6. Center drill this end, then drill a ½ in. hole 1¼ in. deep.
7. Ream this hole about 1/32 in. larger in diameter.

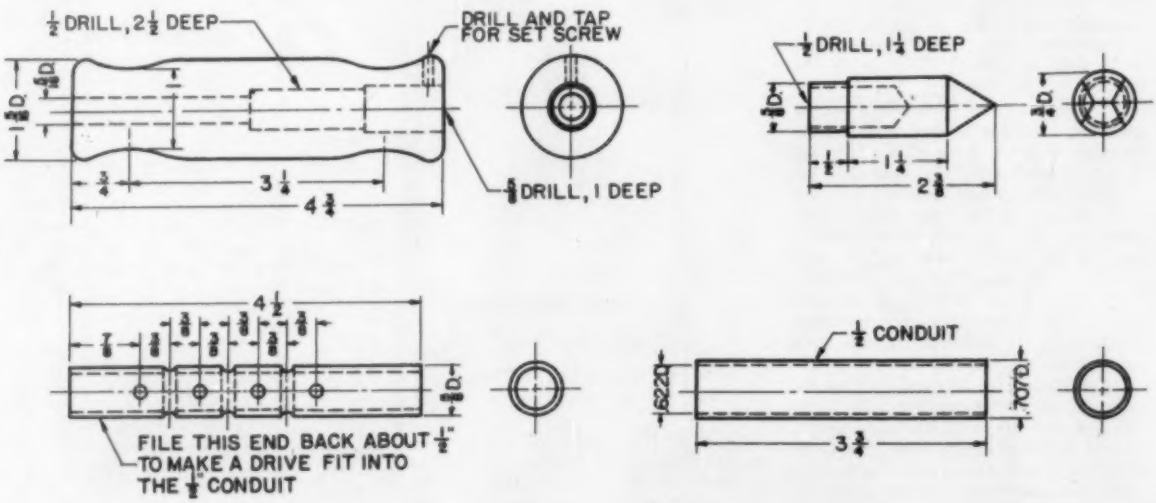
The Heating Element Tube

1. Obtain a piece of ½ in. thin wall conduit, cut squarely on both ends to 3¾ in. long.
2. Ream each end lightly to remove burrs.
3. Drive the ½ in. conduit onto the soldering tip. (Drive on a hardwood block to protect the point and also use a board or drive with a soft faced mallet to prevent damage to the end of the conduit.)
4. Chuck in the lathe and turn the copper to the same diameter as the conduit.
5. File and emery smooth.
6. Make* four equally spaced indentations around the conduit over the joint with a prick punch. (One may also rivet the joint on each side rather than making the indentations. If riveting is done, countersink the holes in the conduit slightly, then after peening the rivet, file it smooth with the conduit.)

The Barrel

1. Obtain a piece of ⅝ in. O.D. tubing 4½ in. long.
2. Ream each end lightly to remove burrs.
3. File one end just enough to make a drive fit ½ in. into the conduit. *Do not* drive the barrel into the conduit at this time.
4. Drill a series of equally spaced 5/16 in. ventilating holes at right angles as shown in the drawing.
5. File the inside of the tubing to remove burrs from the ventilating holes.

*Due to the unequal expansion of the conduit and the copper upon heating, we have found this step to be necessary in order to prevent the tip from coming loose from the heating element tube.


½ DRILL, 2½ DEEP
DRILL AND TAP FOR SET SCREW
⅝ DRILL, 1 DEEP
½ DRILL, 1¼ DEEP
FILE THIS END BACK ABOUT ½
TO MAKE A DRIVE FIT INTO
THE ½ CONDUIT
½ CONDUIT

Handle

1. Obtain hardwood stock 1½ in. square by 6 in. long.
2. Prepare for the wood lathe.
3. Turn to the shape and size in the drawing or to your own desired shape.
4. Sand and apply a French polish.
5. Cut off waste from each end and apply a finish.
6. Locate and mark the center of both ends with a center gauge.
7. Drill a 5/16 in. hole clear through the handle, being certain the hole is centered on both ends.
8. On one end, drill a ½ in. hole 2½ in. deep.
9. Enlarge this ½ in. hole with a ⅝ in. drill to only 1 in. deep.
10. The ½ in. by 1½ in. drilled space will provide space for the Underwriters Knot and splices on the heater cord. The knot is necessary to prevent strain on the heating element leads.
11. Drill and tap a hole near the end of the handle with the ⅝ in. hole. This will be used for the setscrew to secure the handle to the barrel.
12. A small setscrew set flush with the surface of the handle works nicely.
13. Setscrews are easily made by cutting the head off of machine screws and sawing a slot in the stud.

Assembly and Finish

1. Place the heating element in the conduit and copper tip.
2. Drive the barrel into the conduit only ½ in. deep. (If the barrel is driven deeper than a ½ in. into the conduit the heating element may be damaged.)
3. Attach the heater cord to the plug.
4. Push the cord through the handle; tie an Underwriters Knot and make, solder, and tape the connections to the heating element leads.
5. Force the barrel 1 in. into the handle and tighten the setscrew.
6. Polish the metal surfaces brightly with steel wool or very fine emery cloth.
7. Plug your soldering copper into a 115-volt line and tin the tip well. ◀

DISPLAY PANELS FOR ELECTRICAL PROJECT KITS

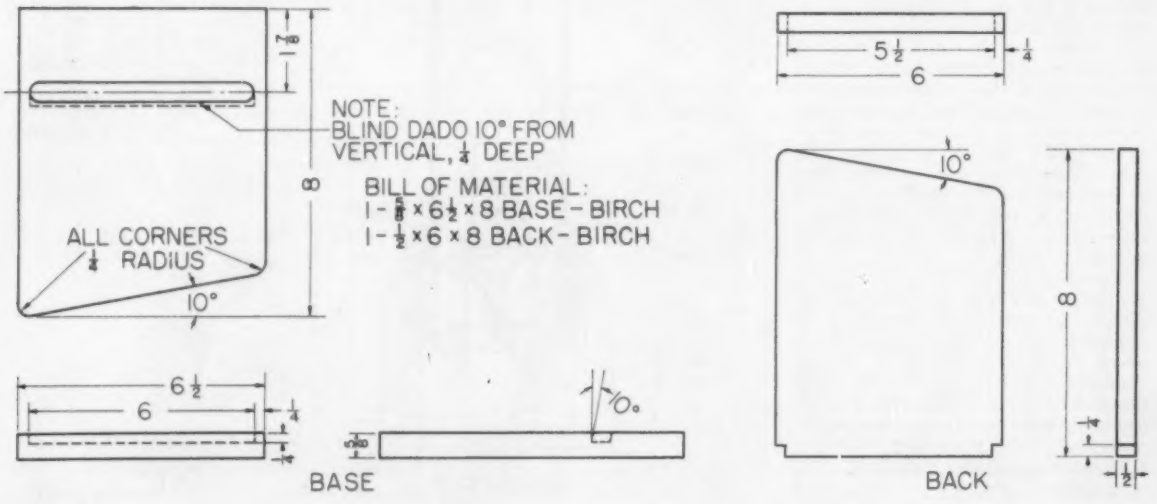
WALDEMAR E. KLAMMER and THOMAS WILLIAMS

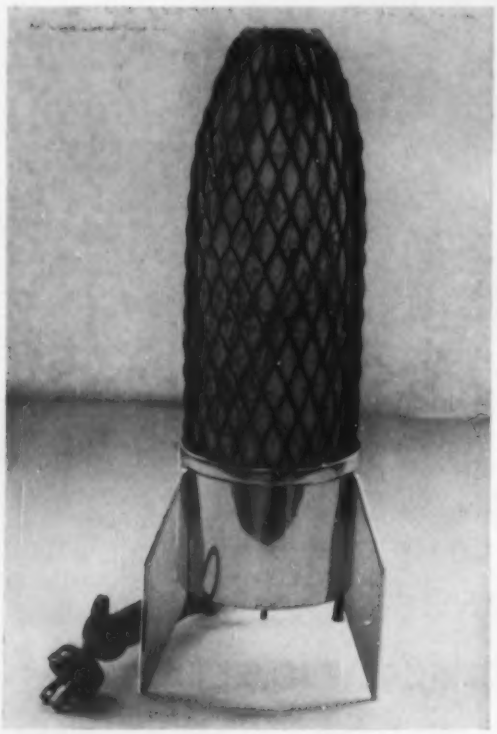
Western Michigan University, Kalamazoo

Many teachers are finding that the commercial kit is an efficient way of teaching the fundamentals of electricity. To show the student the parts of the kit and how it should be assembled try making a display panel.

As seen in the photograph, the parts are mounted on the back panel and a working model is on the base. The back is glued into a blind dado cut into the base at a 10-deg. angle. Parts are mounted with contact cement.

In addition to being good for display purposes this panel serves as a very functional teaching aid. The various parts can be readily seen as the use and construction of the kit is being discussed. ◀





A ROCKET LAMP

LESLIE A. KOCH
Instructor of General Metals
San Jose, Calif., High School

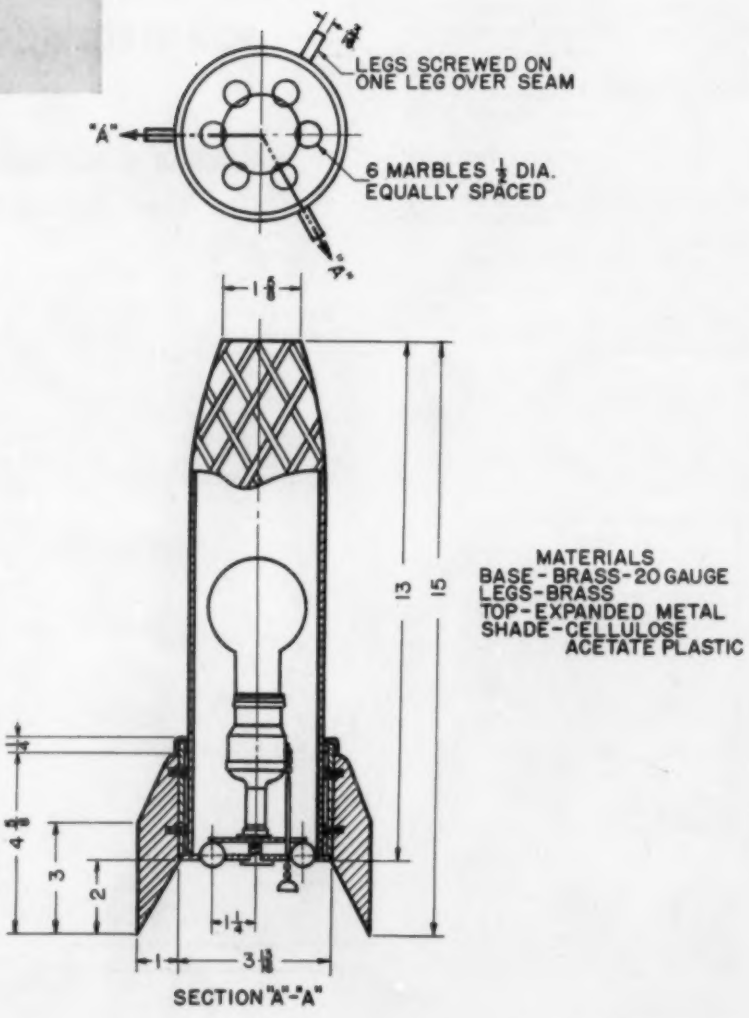
The space age has shown its effect upon project design. Since our original rocket lamp was developed, students have shown a keen interest in constructing the project, with many variations and design improvements.

This lamp is unique in that the light shines through the marbles in the base creating an interesting glowing light beneath the lamp. Different colors of marbles and shade material create various effects. Red marbles give the impression of "blasting off" while blue an impression of speed necessary for space travel.

The dimensions in the plan should serve as general guides only. Students will invariably wish to redesign the fins and seem to have their own ideas as to number of fins, rocket tubes, cone shape, height, and diameter.

The base can be made entirely of brass or iron or a combination of both metals with the fins either screwed or soldered in place. The top rim of the cup is a piece of 20-gauge brass, ⅝ in. wide, folded lengthwise in the bar folder, compressed over a scrap piece of sheet metal and rolled to the correct diameter in the forming rolls. The scrap piece is removed and the rim is soldered in place.

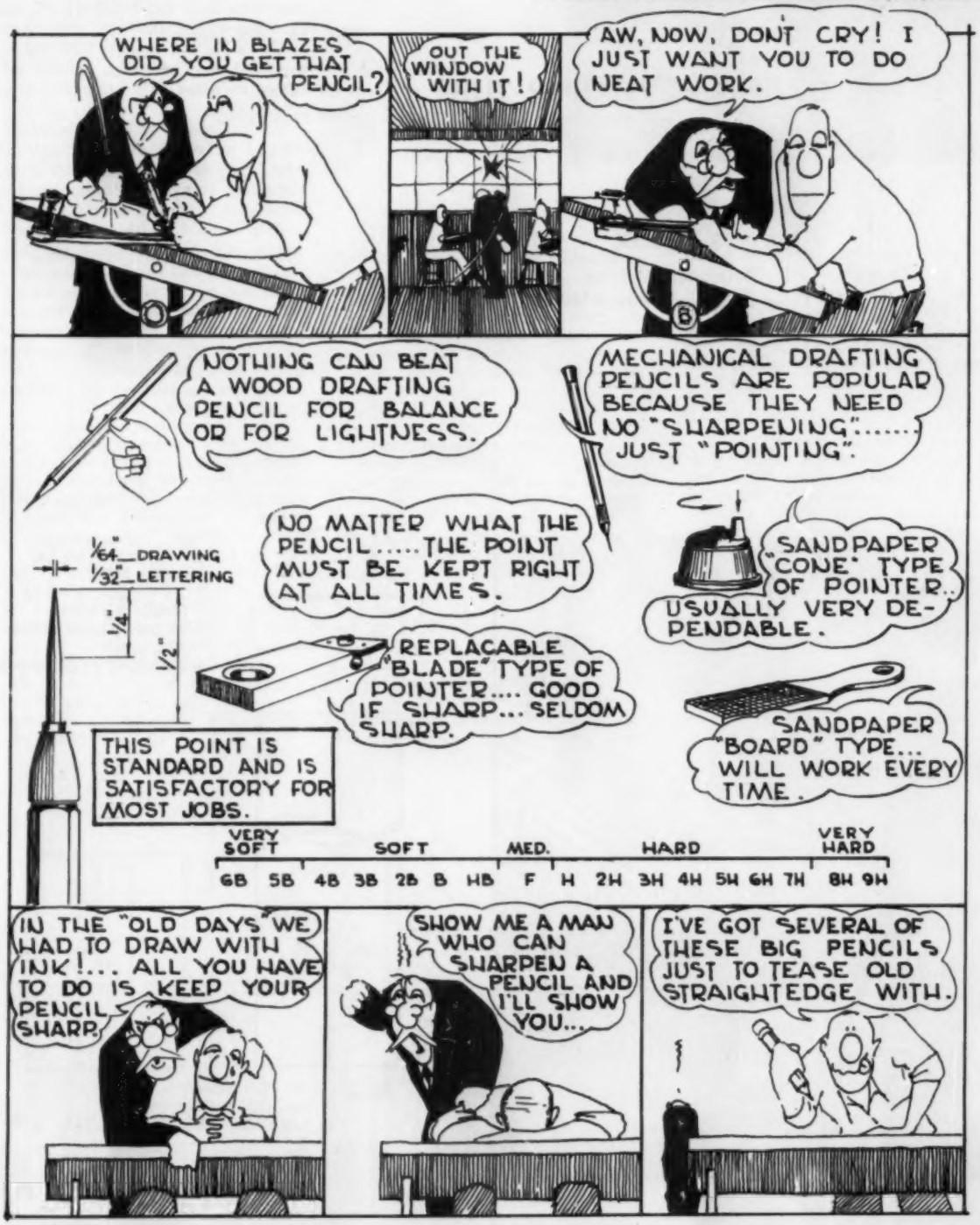
The expanded metal top is rolled to a cylinder and brazed or soldered together. One end is then compressed by squeezing each diamond opening with a pliers. The cone is formed by working gradually around the top two rows until the desired shape is achieved. The expanded metal top is compressed or expanded to fit snugly into the base. It is then removable for light bulb replacement.



OLD STRAIGHTEDGE

THE DRAFTSMAN

BY JOHN D. SPRINGER


WHERE IN BLAZES DID YOU GET THAT PENCIL?
OUT THE WINDOW WITH IT!
AW, NOW, DON'T CRY! I JUST WANT YOU TO DO NEAT WORK.
NOTHING CAN BEAT A WOOD DRAFTING PENCIL FOR BALANCE OR FOR LIGHTNESS.
MECHANICAL DRAFTING PENCILS ARE POPULAR BECAUSE THEY NEED NO "SHARPENING"..... JUST "POINTING".
NO MATTER WHAT THE PENCIL..... THE POINT MUST BE KEPT RIGHT AT ALL TIMES.
1/64" DRAWING
1/32" LETTERING
1/4"
1/2"
THIS POINT IS STANDARD AND IS SATISFACTORY FOR MOST JOBS.
SANDPAPER "CONE" TYPE OF POINTER.. USUALLY VERY DEPENDABLE.
REPLACABLE "BLADE" TYPE OF POINTER.... GOOD IF SHARP... SELDOM SHARP.
SANDPAPER "BOARD" TYPE... WILL WORK EVERY TIME.
VERY SOFT
SOFT
MED.
HARD
VERY HARD
6B 5B 4B 3B 2B B HB F H 2H 3H 4H 5H 6H 7H 8H 9H
IN THE "OLD DAYS" WE HAD TO DRAW WITH INK!... ALL YOU HAVE TO DO IS KEEP YOUR PENCIL SHARP.
SHOW ME A MAN WHO CAN SHARPEN A PENCIL AND I'LL SHOW YOU...
I'VE GOT SEVERAL OF THESE BIG PENCILS JUST TO TEASE OLD STRAIGHTEDGE WITH.

THE OZALID DEVELOPER TUBE

S. J. MARK

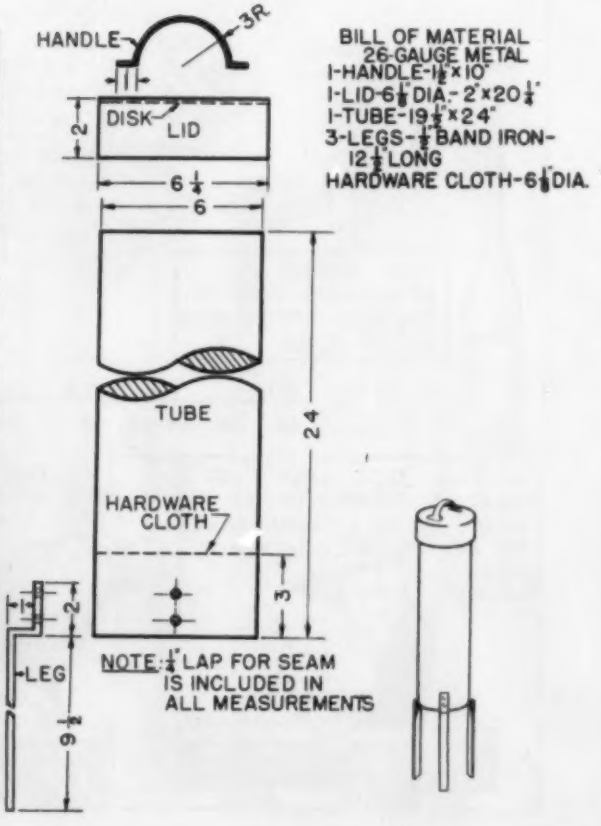
Instructor, Drafting
Kirby-Smith Junior High School
Jacksonville, Fla.

In the final six weeks of ninth-grade drafting instruction at the Kirby-Smith Junior High School in Jacksonville, Fla., the boys ink some of their drawings on tracing paper. To furnish the experience of running the tracings through for blueprints and ozalid prints, we use "sun frame" and the "spee dee" printers to expose our prints to light and we use bichromate of potash crystals dissolved in water to develop our blueprints.

To develop our ozalid prints, we developed an ozalid developer over an open bottle of ammonia instead of the customary cotton wad soaked in ammonia and dropped in a cardboard tube.

With the aid of the school's metals teacher, the tube as shown in the working drawing was developed. To use it effectively, merely place it over an open ammonia bottle until it fills the tube with fumes. Then lift the lid and drop in your paper. In a few minutes, you have your ozalid print.

The tube can also be used to develop Drazo prints.



A DISPENSER FOR SANDWICHES

GEORGE HANEY
Instructor for Mechanical Drawing
Brandywine Springs Junior High School
Wilmington, Del.

A sandwich dispenser which not only keeps sandwiches of various kinds separated from one another, but also identifies each variety, has been devised by Arthur W. Twitchell, a former ninth-grade student at Brandywine Springs Junior High School, near Wilmington, Delaware.

A cafeteria manager at a local elementary school had been having difficulty in identifying sandwiches and in keeping them separated during the rush-hour lunch periods. She tried to purchase a dispenser from a cafeteria supply house but they did not have any. She then consulted the author about the problem and the above student was assigned to work on the problem of design and construction of such an item. This sandwich dispenser is designed to have one compartment holding 25 sandwiches, or six compartments holding up to 150 sandwiches. There are removable inserts above each compartment which provides space for the various kinds of sandwiches and also the prices. The clear plastic is easily washed.

Cutting and Cleaning the Plexiglas

Plexiglas can be cut very satisfactorily with a fine-toothed circular saw. The plastic must be pushed through the blade slowly to avoid the plastic from chipping at the edges.

The formation of the radii on the panels and back is done with a disk sander. If the radii were done on a jig saw or a bandsaw, they would probably be jagged and not smooth.

Before assembling the cut pieces in place, the edges of all the parts must be sanded. This is done by placing sandpaper on a flat surface and drawing the edges back and forth over it. The sandpaper used is "220-A" wet and dry sandpaper and "500-A" wet and dry sandpaper. The "220-A" is a rough grit, therefore this is used first to smooth out all marks made by the saw blade. The "500-A" is a finer grit and is used to put a fine finish on the edges. Be sure to keep the sandpaper wet at all times for best results. If Plexiglas has the protective masking tape on its surfaces, remove it. There wil be a sticky substance left on the plastic from the tape. This can be removed with soft soap and water, using a soft rag or tissue paper. Antistatic waxes which can be bought at plexiglas dealers will remove this sticky substance and leave the Plexiglas clean and free of static electricity.

Gluing the Pieces

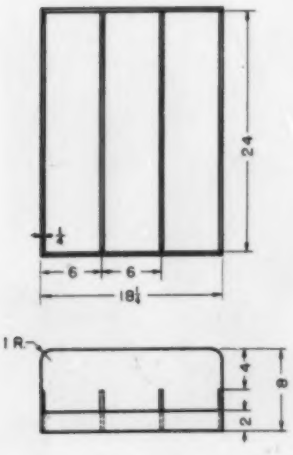
When the parts are clean, you are ready for the gluing. Be sure that all pieces fit in snugly and that all corners are square before gluing.

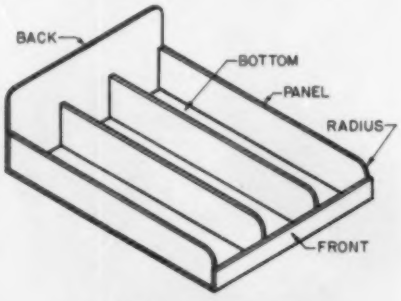
Step 1. Hold "front" at a 90-deg. angle up to the front of the "bottom." Run hypodermic needle filled with cement along the inside seam. The capillary action will cause the cement to fill in under the two parts. Apply a little pressure at the joint until cement begins to hold pretty tight (about a minute or two).

Step 2. Measure off the distance between the "panels" allowing for the thickness of the panels. A grease pencil or crayon may be used for marking. Place the panel on the "bottom" at a 90-deg. angle. The side of the panel with the radius should be in contact with the front. Looking at it from the top, the panel is perpendicular to the front and flush with the right edge of the "bottom." Apply the cement at the seams as in step 1. Apply pressure (not too hard) as in step 1.

Step 3. Place the next panel on the point you marked off in step 2 so that it will be perpendicular to the "front" (top view) and on a 90-deg. angle from the "bottom." The surface of the second panel toward the first panel should be 5⅝ in. from the inside surface of the first panel. Apply cement and pressure as in previous steps. Do this with the next two panels.

Step 4. "Back" should be placed on the end of the sandwich dispenser which is opposite the front. See that the edges of the two sides and the bottom of the "back" are flush with the surfaces of the outside panels and the outside of the "bottom." Apply cement and pressure.





ALL RADII HAVE A RADIUS OF 1

BILL OF MATERIAL

NO. OF PCS.	SIZE TH.	W.	L.	NAME OF PART	KIND OF MATERIAL
1	¼	2	18½	FRONT	CLEAR PLEXIGLASS
1	¼	18½	24	BOTTOM	" "
1	¼	8	18½	BACK	" "
4	¼	4	24	PANEL	" "

IA/VE
special / report

the technical electronics program

Spurred by the National Defense Education Act, many school districts have, or are planning, to set up programs for training the technician, a category of personnel vitally needed in our technological age. From early trends, heaviest activity in these programs is in the area of electronics, and here are reports on two approaches to such courses—

—Business Week

The Electronics Laboratory in Springfield

HANK BILLINGS

Russia's Sputnik shocker to the contrary, there's no shortage of engineers in the United States, said David Berryman, director of vocational and industrial education for the Springfield, Mo., schools.

"An official of the United States Department of Labor has said he can show you statistics indicating we have plenty of engineers," Berryman said.

"It's just that the engineers are being used in many cases to do the jobs of technicians we don't have," he explained.

Springfield's public schools system is doing its part in fighting shortage of skilled technicians — with a new electronics course housed in the industrial arts building at Springfield's Central High School.

Half the cost was borne by the Federal Government under Title VIII of the post-Sputnik National Defense Education Act of 1958. The other half was financed by the Springfield schools, under superintendent Willard Graff.

The Curriculum

First class started last fall with a dozen junior and senior boys from Central and from Springfield's other two high schools, Parkview and Hillcrest. Students attend morning classes at their respective high schools and the three-hour electronics course at the newly designated "Springfield Vocational-Technical School."

Springfield, which has grown to an estimated 110,000 persons from a population under 90,000 in 1950, has begun attracting industry in recent years.

The two biggest and most recent industrial plums, Royal-McBee Typewriter and Dayton Rubber, offer a limited market for electronic technicians.

However, there's the Rocketdyne plant at nearby (60 miles) Neosho, Mo., and aircraft plants within a 250-mile area, at Wichita, St. Louis, and Tulsa, Okla.

At present, instructor Berryman's only other course under NDEA's Title VIII is technical drafting and design, taught in the same building in a three-hour course for all high school students. However, Berryman hopes to add a course in jet engine mechanics under the same program.

At present, the course is a two-semester, one-year offering, although a manual and lesson plans for a three-year course with the equipment installed in the school is available.

"We'll try to cover more than just the first year for these boys," said instructor Stainbrook, "because many of them are seniors and this is the only chance they'll have."

Stainbrook said the school isn't equipped to cover the third year of instruction, which includes sonar and radar.

The new course replaces last year's radio repair course.

"Many boys expect this course to teach them how to fix radios and it's not that at all," said Berryman.

Actually, explained Berryman and Stainbrook, the course covers basic circuitry, tubes and transistors included in radio, radar, television, missile guidance systems, and other electronic gear.

Through mid-October of the school year the students work with theory and a good deal of math, as they learn that technicians work with the head as well as with the hands.

Then comes the practical work, with Stainbrook pointing out various circuits on a circuitry demonstration panel. Parts on the panel are arranged as in a radio or TV set — actually the panel can serve as either — except on a schematic diagram, spread out and easier to see than in sardine-like electronic gear.

Students encounter the realistic compactness of parts in laboratory units. Working with three students to a unit, they will duplicate circuits from the demonstration panel.

At this point, Stainbrook can "bug" the circuit by dipping into a supply of perfectly good appearing but thoroughly defective tubes, resistors, or other parts.

Students, using testing equipment and trouble shooting methods, are expected to locate and exterminate the bug.

Later in the course, the students progress to newer, and smaller, transistor circuits, building up or repairing various circuits with peg board kits.

There is no tuition for the course, but students must be juniors or seniors who have had a preparatory course in applied electricity.

Under the government participation plan, students aren't obligated to enter the line of technical work in which they train, but the training must be in a line supporting national defense.

Adult Education Utilization

The electronic training equipment also is being used in a night course for journeymen electricians here. The equipment was manufactured by the Tech. Rep. Division of Philco.

Under the same National Defense Education Act, 75 per cent of the cost is paid by the state and federal government. The other 25 per cent is borne by the electrical union here so the night course "doesn't cost the board of education a cent," said Berryman.

Mr. Billings is a reporter for the Springfield, Mo., **News and Leader.**

Instructor Stainbrook is shown pointing out a feature of a circuitry demonstration panel to members of his class. On shelves to his left are other panels with different circuits displayed. With laboratory units, students work with compact form of circuit equipment.

"We thought maybe the math would discourage some of them, but no one has left yet, and I'm going to have to divide the class again," Berryman declared.

Like the high schoolers, the electricians meet for three hours and cover the same general material.

Berryman believes there'll be an increased demand for the course next year among high schoolers, but the class can't be much larger without purchase of additional equipment.

Berryman believes educators have just scratched the surface of technician training necessary in these times of increasing automation. He said statistics show that in many plants, where production workers once comprised more than 60 per cent of the total employees, the total force now is equally divided between administration, engineering, production, and technician employees.

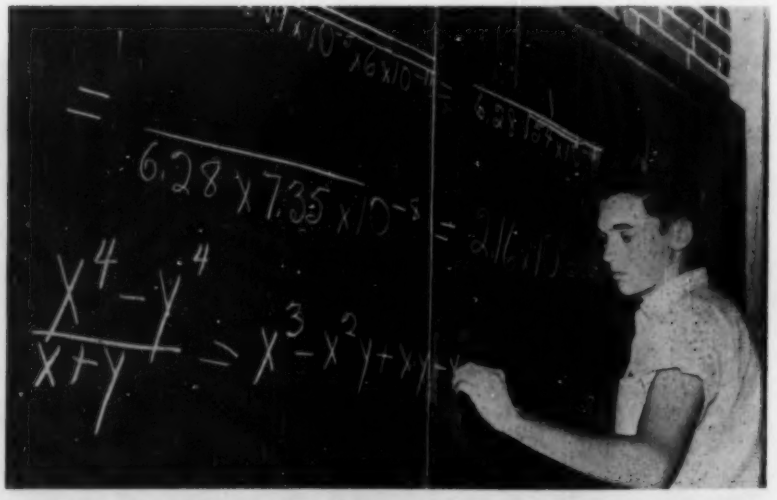
"Vocational instructors have tried to come up with a definition for a technician, but about all we can say is that it's somewhere between skilled production workers and engineers," Berryman said.

"Engineers, of course, must have college degrees, but these boys can go right into good jobs as technicians out of high school. Engineers are supposed to be free to do the planning and creating, but because there haven't been enough technicians they've had to do those jobs, too." ◀

— Photos by Ned Baker

Flanked by an open manual and assorted loose ends, a student in Springfield's electronics course tackles a project on a transistor laboratory peg board.

An electrical engineer for a Springfield electrical concern is the instructor. When 55 showed up, instead of the 12 or 15 desired, the class was divided into two sections.



An illustration of the typical mathematical formulae faced by students in Springfield's technical electronics course.

Technical Electronics at Levittown

BERNARD F. RAPPAPORT

The impact of the Russian "Sputnik" on American education is beginning to have its first permanent repercussions. To provide the necessary technicians to work on the engineering team in industry, the Federal Government passed Title VIII of Public Law 85–864, in December, 1958, which is commonly called the "National Defense Education Act." This part of the legislation is to provide the training for highly skilled technical occupations in local industries associated with military or defense activities.

Studies have indicated that the creative work of engineers is moving farther away from the manipulative skills of the craftsman. It has been estimated that the engineer requires at least six trained technicians to carry on the related work of inventing, designing, production, and testing. The primary objectives of Title VIII of NDEA legislation is the training of these highly skilled technicians in occupations affected by scientific and technological developments which meet national defense requirements. The job title indicates that the training is in a highly specialized scientific field requiring a broad knowledge of the subject and its application.

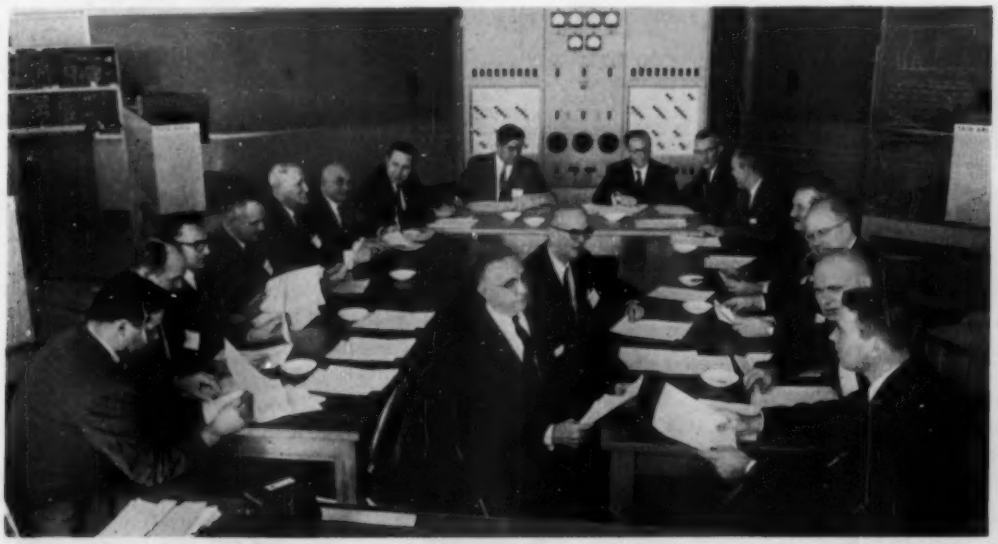
In the Long Island area of New York State, this shortage has been particularly acute in the field of electronics. Surveys of local industries conducted by education personnel have indicated that the need for electronic technicians is growing rapidly each year. Conversations with representatives of the State Department of Labor, the Area Development Council of the Long Island Association, and representatives of leading industries on Long Island have indicated that this lack of highly skilled technical personnel will increase rather than diminish in the ensuing years.

In the original preliminary application by the Levittown schools under superintendent Fred Ambellan to the state department of education requesting consideration for the allocation of funds to our district, letters from local industry endorsing the particular need for this area were enclosed as substantiating material to the district's claim.

Once the approval was received from the officials in Albany, the big program of organizing and selecting equipment and facilities, selection of students, development of instructional

Dr. Rappaport is supervisor of Industrial Arts and Vocational Education, Union Free School Dist No. 5, Levittown, N. Y.

— Associated Products and Service Co.



Representatives of Long Island electronics industry met with Levittown, N. Y., school officials to plan the district's new Electronics Technology Laboratory. At the head of the table (in the background facing the camera) are shown: Robert Hoshino, president of the board; Dr. B. J. Rappaport, supervisor of industrial arts and vocational education; James Riley, principal of Division Avenue High School where the laboratory is contained; and Fred Ambellan, Levittown superintendent of schools.

materials, and selection of the instructor had to be set in motion. It was realized that for any truly new electronics training program, functional in nature and meeting the needs of local industry, it would be necessary to work very closely with people in the industrial field. It was considered judicious that, rather than building a program entirely along the lines of other electrical programs in other schools, it might be best to involve the most advanced thinking of local industry so that the curriculum and materials of instruction would not be outmoded by the time the instructional program was under way. This would also pave the way for evening offerings for adult industrial training.

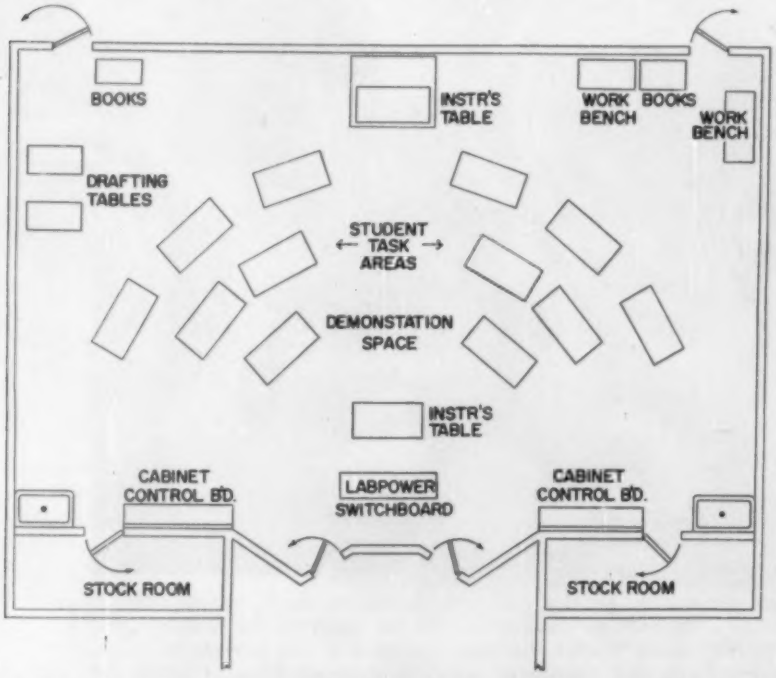
Industrialists Worked With Board

To insure success along this line, key people in local industry were invited to the Levittown board of education offices to work with the administration in planning the facilities. While all of these people were intimately interested in the scientific and technical knowhow of the final product, they also emphasized that students should be well founded in the basic fundamentals common to all areas of instruction. They pointed out that technicians must be able to read complicated manuals and interpret them correctly; they must be able to do the necessary research and their own planning; they must write analytical reports and do some creative thinking in their work. All this involves a solid academic background. In addition, they wanted the finest in technical education in the fullest sense of the word. One leader of industry indicated that the students should know "why a particular circuit operates, not only how." They should know the theory behind every component and should be familiar with all the test instruments so that their use in daily activities would become second nature. This thinking formed the initial pattern and provided the ground work for the development of the technical electronics program in the Levittown schools.

In working with these leaders of industry it was indicated that, in existing programs, too much time is spent in the study of rotating machinery. It was pointed out that the time may be more profitably spent in advanced study of vacuum tube and transistory circuitry. This, too, formed a pattern for the development of our equipment. Many of these concerns have their own training programs for upgrading employees. They indicated the type of equipment on the market which they found most suitable and which seemed to meet a distinct need.

At this point plans were formulated for the equipment and material needs of the physical facilities. A survey was made of existing education facilities. Many of the problems of installation of equipment and instructional handicaps noted by others in the field were taken into consideration. All along the planning stages, close contact was kept with the Bureau of Trade and Technical Education in Albany. From the time the contract was awarded until the deadline stipulated in the federal enactment, there were only four months to order, equip, co-ordinate, install and pay for the final product. The equipment was purchased from Labpower Division of Associated Products and Service Co.

While action was being taken to equip the physical facilities of the technical electronics laboratory, action was being taken to select the proper students for this program. This is one of the most important phases of good technical education. Without the proper student personnel, any excellently conceived plan may ultimately deteriorate into a second-class program. Therefore, a co-operative course of action was planned with the secondary school principles in the district and their guidance personnel. Utilizing the available recommendations of the state department of education and other experts in the field, it was explained to these administrators that in order to succeed in an ultimately worthwhile program of technical education, it was necessary to secure students with a minimum of 110 I.Q. It was thought that students of this caliber were necessary to understand fully the technical and scientific information that is such a necessary part of this program. After explaining the philosophy and objectives of the program to these vitally concerned people, discussion resulted in recommendations which were to implement the selection of the student.



A floor plan of the layout, illustrating the "amphitheatre" arrangement which permits the instructor to observe student task area activity.

Interest Important

As a preliminary requisite, the guidance personnel decided that a minimum of 115 I.Q. was necessary. Second, as a result of the guidance aptitude tests given in the district, it was considered appropriate that the second requirement would be that the student place in the upper 25 per cent in every phase of a Differential Aptitude Test. These areas represented aptitude testing in verbal skills, numerical skills, mechanical skills, abstract relationships and special relationships. Not withstanding the fact that interest is of prime importance in motivation, these pupils who passed the preliminary screening were interviewed. At this time the broad objectives of the course were outlined to the students.

In essence the objectives were

threefold: (1) the program is the finest college preparatory course available, (2) it presents an opportunity for preparation in a highly skilled technical field, and (3) it affords an opportunity to attain a position in local industry immediately upon graduation from school and continued education in an institution of high learning, with tuition paid by the company. This is the general policy of electronics firms in the Long Island area.

The program outlined meets a specific need in the Levittown, New York, area. Surveys in the past have indicated the following: (1) the average adult in Levittown has some college education, (2) over one half of all the students currently enrolled in the junior high schools have over 110 I.Q., (3) many of the High School graduates, who are qualified for college, do not go on to further education mainly for economic reasons, and (4) almost all junior high school students indicated their desire to attend college.

As described, the program meets the realistic need. It serves as a "dual-purpose" curriculum. The students are not only provided with the academic preparation for entrance into college, but also receive the technical information for highly skilled employment.

Once the students were aware that this program is a valuable asset for their acceptance by a college and that they would be prepared in the best manner possible for high-level skilled employment in industry, this technical program was something to be desired and achieved.

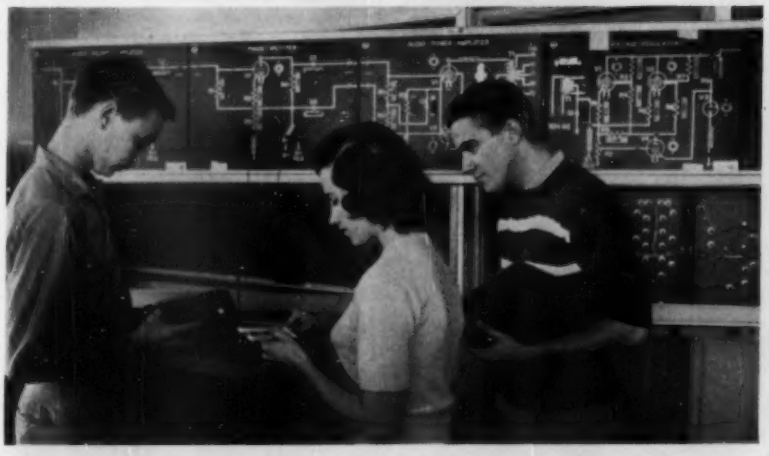
The pupils' interview sought to determine their interest, to evaluate their past scholastic record, and to acquire any other items of necessary information that could not be noted by previous guidance records and results of the testing program.

Those pupils who showed the aptitude, had the intelligence, had the interest, and had high standards of achievement in previous grades, were then subjected to a test designed to select pupils for scientific high schools. This battery of tests was graded by an outside agency and the final results returned to the school district. From these lists were the final students selected.

Program for Parents

Before final selection was made, an evening program was set up for the parents of these selected children. They were reinformed of the objectives of the program, and were given any opportunity to ask any ques-

"While good facilities and students with a high potential are essential elements of any technical program, the key individual . . . is the teacher."



Problems which must be solved before a program of this type meets current needs include: (1) knowing what kind of a technician you want to produce by designating specific courses for local needs; (2) setting up a curriculum to keep pace with changes in technology as well as with basic industrial needs; (3) selecting the type of students best fitted by intelligence and interests for this type of training; (4) purchasing the right, up-to-date equipment; and (5) finding the best qualified, technically trained teachers.

tions. They were made fully cognizant of every aspect of the program. It was explained to them that these select pupils would work harder than other pupils. They would remain in school 45 minutes longer than any other pupils and would have no study halls in which to do their homework. They would fully utilize their inherent abilities and the school facilities. This was the final opportunity for any parent or child to withdraw from the program. It was further pointed out that this was a most desirable, educational program. It was indicated there were limited facilities for many children, and it would be unfair for any pupil to take away the space of another in lower standing on the eligibility list if this individual was not fully interested and did not evidence every indication of promise in completing the entire program. Following this meeting, the parents signed a statement reaffirming the desire that their child take part in this educational venture.

The classes were made slightly larger than necessary and educationally desirable. The purpose was to enable the administration to be more selective in the quality of the student as the program developed. With larger classes starting and with the normal rate of attrition, students leaving the district, and other causes, classes would not drop below a level detrimental to the future of the program. In a district where the public eye is always on the budget, this, too, makes a good impression. No new pupils are added to a program of this type in the middle of the school year. Therefore, proper class size level may not be maintained.

While good facilities and students with a high degree of potential are essential elements of any technical program, the key individual who will ultimately determine the success is the teacher. He must not only have the technical background to provide the children with the latest and the best in scientific information but he must have those desirable personality characteristics that would motivate students to greater efforts and create an interest in the subject matter that is being studied. When interviews are carried on, the candidate's ability to teach and his ability to get along with pupils become dominant factors in the final selection. A prospect's records must be carefully scrutinized in order to predict as closely as possible their ultimate in the classroom. All these factors were considered.

In no instance should the vocational administrator compromise with a second-rate teacher who will only produce a second-rate program. The standards, as set forth by the local state department of education, should be adhered to very closely. In the particular instance of Levittown, N. Y., an electrical engineer was required. In addition, a minimum of three years' experience in electronics was required of all candidates. There are many electrical engineers seeking employment who have vast experience in the field of power generation, transmission, and distribution. However, all evidence indicates that they would have little to offer in the field of electronic communication and industrial controls. While their ability may not be severally questioned with the high school students, the practicality of their conducting advanced electronics training programs in the evening is subject to question.

There are many course of study available in the various areas of technical education, but rapid advances made it necessary to evaluate the material each year to determine whether it has become outmoded in its industrial application. A tentative course of study was written and based, in part, on existing courses of study and their feasibility in terms of our present equipment. As each lesson is given, it is evaluated, checked for student understanding, and placed within the total course of study. When the present list of laboratory sheets and teacher demonstration lessons have been completed, they will be submitted to local industry and state offices for their evaluation and comment.

The entire technical program is organized within the complex of a comprehensive general high school. Academic subjects are taken with the regular students pursuing a college preparatory curriculum. As was previously indicated, the pupils have a nine-period day, which is longer than the other students in the district. This presented a special problem of transportation since their dismissal was not at the regular hour. However, this was easily overcome.

The curriculum for the pupils enrolled in the technical electronics program included: four years of English, four years of citizenship education, four years of high school mathematics, four years of science, three years of a foreign language, three years (2 periods per day — 1½ hours) technical electronics, and four years of physical education.

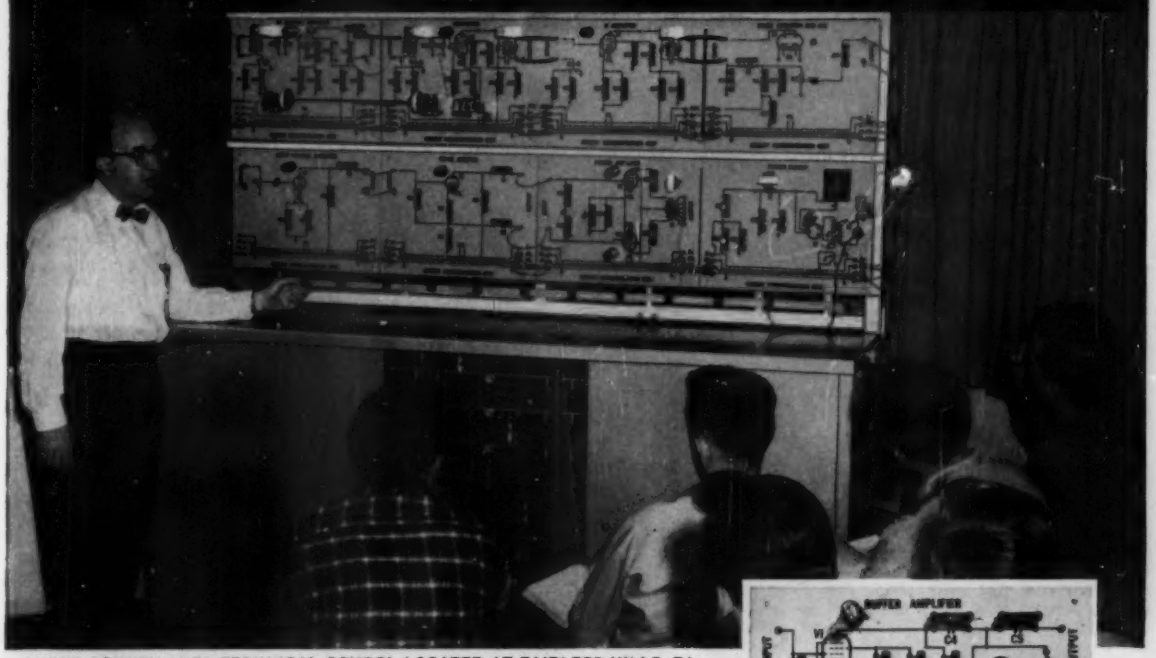
Since many of the pupils are advanced students and begin their high school mathematics in the eighth grade, many elect to take a fifth year of mathematics which included analytical geometry and differential calculus in the last year. The foreign language is begun in the ninth year so that there is time for an elective subject in the twelfth grade.

Surprisingly enough, most of the students are enrolled in some form of extracurricular activity with over half the boys in some form of organized and supervised competitive sports. There are six girls enrolled in this technical program, which is in keeping with today's labor trends.

Use of the main power panel is explained by the instructor.

Schools increase electronics training with aid of Defense Education Act

Schools from coast to coast are utilizing the financial aid of the National Defense Education Act to bolster electronics training programs. Approved purchases to date show interest centered on up-to-date electronics training equipment and materials.



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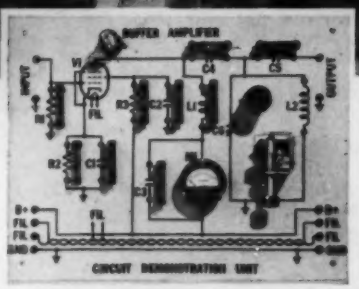

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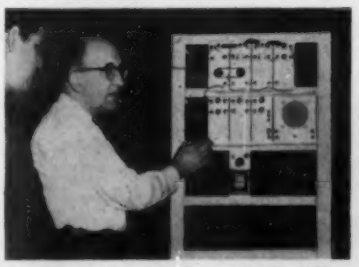

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▶ strong statements of support for vocational education

The AVA in Chicago

"When I hear adverse criticism of vocational education, I cannot help concluding that the critic just has not taken the trouble to find out what he is talking about," was a statement of support voiced by keynoter James B. Conant, as he addressed the first general session of the 53rd annual convention of the American Vocational Association.

The 1959 meeting was held December 7–11 at Chicago's Conrad Hilton Hotel.

Conant on Vocational Education and National Need

"Judging from what some critics of American public education have been saying since Sputnik," he added, "I cannot help wondering if their ignorance of vocational education is not at least as great as was mine three years ago (when he started his high school survey)! I do not see how anyone who has visited the kind of practical courses I visited could recommend eliminating vocational and practical work from the high school."

Dr. Conant, president emeritus of Harvard, drew from his Carnegie-financed study of the comprehensive high school in America to focus thought on "Vocational Education and the National Need."

By way of background to remarks on this subject, he noted four "difficulties in talking sense about vocational education":

1. The situation varies from community to community. "What would be a good vocational high school program in one city would be absurd in another. This prevents the kind of generalized discussion which most laymen like."

2. Terminology. "To the outsider it seems a mystery why instruction in auto mechanics in a high school is labled 'vocational' while instruction in stenography or the use of clerical machines is not. And it still remains a mystery to me why, in one school, all the shop work is industrial arts and, in another, a similar shop (but with a different instructional program) is organized as part of vocational training."

3. History of vocational education in this nation. ". . . In at least three states vocational education (defining the term narrowly as do the state and federal laws) cannot be part of a widely comprehensive high school. I have in mind also, to be quite frank, that there has not been the close liaison, it seems to me, that one might have wished between the teachers of general education subjects (language arts, social studies, art, music, science, and mathematics), the teachers of commercial subjects, and the teachers in the vocational subjects. And at the administrative level, I seem to have detected something short of complete trust and understanding."

4. A matter of prestige. "Mixing up educational values with matters of prestige has bedeviled the work of teachers for generations in every nation, and I suppose it will continue to do so for years to come. Nevertheless, I feel we should do all we can to destroy an educational myth which has grown up in the United States in this century and which is a result of a false evaluation of education through the intrusion of prestige considerations."

In another area of difficulty, Dr. Conant noted the need for public relations by vocational educators. In talking with laymen, he said that many people "demonstrated very often a lack of knowledge and understanding of the place and importance of vocational education." Some people "seemed to want to restrict the high school to what used to be called 'college preparatory work'; others seem to regard the practical courses as the dumping grounds for slow readers and disciplinary cases."

Also erroneous, he stated, is the idea of those who attempt "to place vocational education in opposition to academic education."

Working into the topic of his address, Dr. Conant said our current "struggle with Sino-Soviet Imperialism" has catapulted the need for us as a nation "to develop the talent of the oncoming generation in areas of technological emphasis." Our free society, of course, cannot force a youth to decide upon a particular "educational future."

The solution to this dilemma? "The answer, to my mind, lies in developing public understanding of the situation, the creation of the proper climate of opinion in every city and town, the improvement of our public schools, continued emphasis on guidance, and an understanding by guidance officers of the national need."

Suggestions for High School Vocational Programs

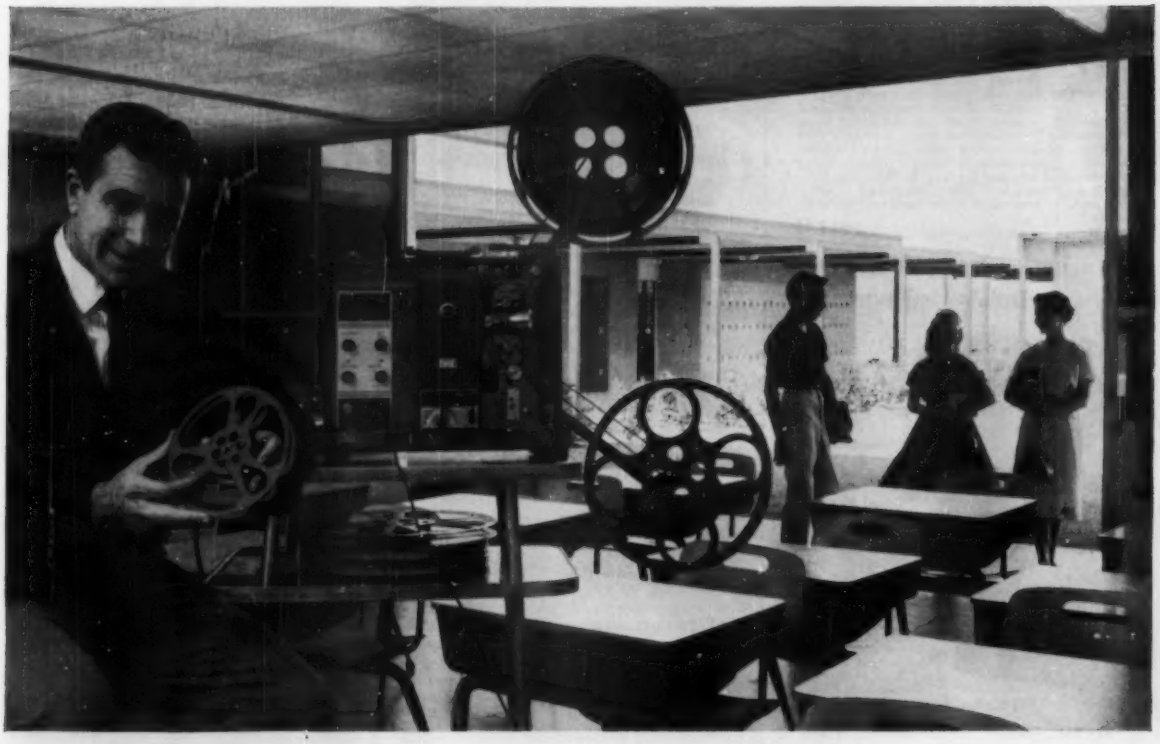
Dr. Conant suggested that vocational programs at the high school level: (1) be related to employment opportunities in the general locality, and (2) be made available for students who are reading two and three grades below their grade levels.

He also suggested that industrial arts classes be related to the students' vocational plans to provide a "motivating force." In this regard, he said:

"My third comment concerns the relations of industrial arts shops to vocational courses. In the lower grades (7, 8, or even 9) industrial arts has its own proper place, and I believe home economics for girls and industrial arts for boys should be part of the required curriculum in at least one year, at the junior high school level. Furthermore, in those relatively few senior high schools where almost all the pupils wish to go to college (whether they can profit from college or not), industrial arts shops in grades 11 and 12 may be appropriate. But I have visited schools in which it seemed that a *vocational* emphasis in the shops would have been highly desirable in order to provide the motivating force to which I attach so much significance; yet the courses were industrial arts courses with a nonvocational emphasis. If my observations were valid, the shop work in these schools in grades 11 and 12 was not worth the expense. Apparently in some instances educational traditions (I might almost say "educational caste lines") had prevented the development of the kind of practical courses in the school which the situation called for. Unless I am much mistaken, a closer co-operation between

(Concluded on page 48)

At the Alamitos Intermediate School, Garden Grove, California, selected by the A.A.S.A. for its exhibit of outstanding school designs, John A. R. Reed, Principal, says:



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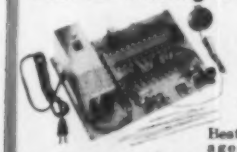

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ASSOCIATION NEWS

(Continued from page 46)

leaders of vocational education and others concerned with practical courses in high school is much to be desired. In short, using "vocational" in the sense that an uninformed layman would, I am inclined to say that all teachers of vocational subjects ought to get together."

Mitchell Lands New V-E Role

Addressing the banquet, co-sponsored by the Illinois Vocational Association (which held its meetings the day following the AVA), Secretary of Labor James P. Mitchell discussed "the trends in manpower needs that are bringing thoughtful citizens to a reappraisal of our educational concepts and methods."

The cause for this reappraisal — Russian achievement — must not be "undertaken under the conditions of crisis," the secretary warned. "The current reappraisal must have balance." It must not be "directed only toward those technical areas in which the competition is keenest, and if its purpose is to shake up our educational system to produce quantities of narrowly educated specialists in priority fields at the expense of general educational avenue, then I think that the Russian achievement has deceived us into cutting off our own nose cones."

Mr. Mitchell told the banqueteers that the nation "needs skillful people to solve the problem of living just as surely as we need skillful people to solve the technical problems of better rockets, better homes, better bridges, and better factories."

He then viewed the role of vocational education in this reappraisal: "I think it would be fair to say that Americans once regarded the vocational school, the technical institute and the training course as the alternative to failure in an academic course of study. . . . Anyone who still holds that view is simply out of touch in reality."

Projecting the labor force in the 1960's, Secretary Mitchell commented that the general occupational demand for "workers with good educational backgrounds is a part of a growth picture of tremendous sweep." . . .

"We must base our educational system on the fact of change. We must prepare our young people to make that change work to their own benefit. We do that by giving them, first, a firm background in academic disciplines and, second by equipping them in a practical way to meet the economic tests of their lives.

"The American Vocational Association has a distinct responsibility in keeping this balance. . . . By offering to our young people an opportunity to develop the talents and abilities that will allow them to take a respected place in society, vocational education becomes an integral element in the grand design of education as a national resource and a source of strength for the free world."

Dr. London's Message

Dr. Conant's blast or criticism of vocational education was emphasized by Dr. H. H. London, AVA president and professor of industrial education, the University of Missouri, in his president's message delivered at the second general session.

He stated that self-styled critics of American education who preach that our schools are guilty of "fans and frills" and who preach a "pure education" program for all students are preaching "pure nonsense."

Dr. London stated he disagreed with this since only 20 per cent of the population goes into professional or semiprofessional employment. To stress advanced solids to

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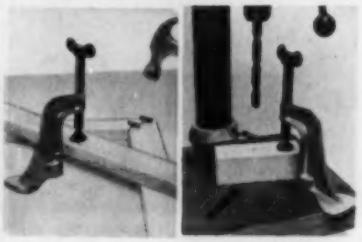

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the other 80 per cent is a "waste of time."

In a press interview, Dr. London pointed out that "Russia says she intends to whip us — not in a shooting war but in production. The business of vocational arts is to perpetrate and improve in these fields. If we do not have an adequate supply of skilled manpower we are liable to lose the war with Russia."

A Call for More "Creative Effort"

Another main speaker was Willard Goslin, former superintendent of schools in Pasadena, Calif., and Minneapolis, Minn.

At the second general session Dr. Goslin, professor of educational administration at George Peabody College, Nashville, Tenn., suggested that "not enough creative effort has gone into vocational education. There are too many of you," he told the vocational educators, "doing today what you did the year before."

Vocational education should be stressed in grades 11 and 12, according to Dr. Goslin. In the junior high school, such training may be interfering more than we think with the so-called academic development of students. Stress on vocational education in grades 11 and 12 allows for a student vocational choice based on more mature thinking and more background training.

Convention Statistics

An official attendance of 4011, including vocational educators, guests, and exhibitors, made the 1959 meeting of the AVA one of the biggest. There were 115 exhibitors displaying a veritable showcase of tools, materials, supplies, etc.

The exhibitors' association, "The Ship," awarded its 1959 citation to John P. Walsh, director, trade and industrial education branch of the Office of Education. The award was presented by Jack Faber, advertising manager of IA/VE.

E. M. Claude, chief, industrial education, Illinois state department of education, was named president-elect; he will serve as president during the 1960 AVA convention, which will be held December 5–9 at the Biltmore Hotel, Los Angeles, Calif. ◀

COMING CONVENTIONS

Feb. 26–27. Industrial Teachers Conference, at Texas A. & M. College, College Station, Tex. Secretary, John Ballard, San Marcos, Tex.

Mar. 11–12. California Industrial Education Association, at Biltmore Hotel, Los Angeles, Calif. President, Dr. Clifford Dobson, 4600 W. Olympic Blvd., Los Angeles 19, Calif.

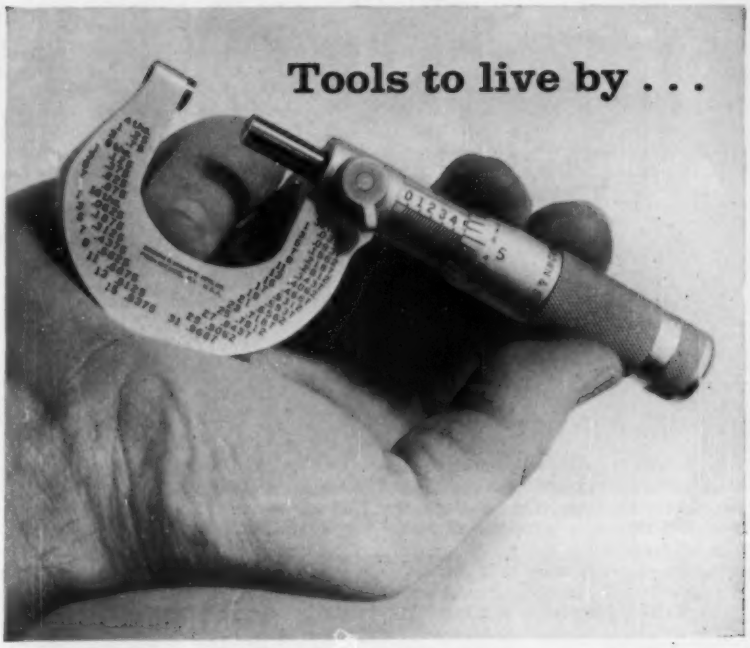
Mar. 17–19. New Jersey Vocational Arts Association, at Hotel Berkeley-Carteret, Asbury Park, N. J. Secretary, Richard Harthmann, 236 Lexington Ave., Jersey City 4, N. J.

Mar. 31–Apr. 2. Ohio Industrial Arts Association, at Neil House, Columbus, Ohio. Pirate, Robert S. Deafenbaugh, 780 Patton St., Newark, Ohio.

Apr. 19–22. American Industrial Arts Association, at Royal York Hotel, Toronto, Ont., Can. Pirate, George H. Ditlow, 1730 Colonial Manor Drive, Lancaster, Pa.

Apr. 21–23. New York State Vocational & Practical Arts Association, at Linton High School, Schenectady, N. Y. President, Reno S. Knouse; Exhibit chairman, Charles W. Clark, 1435 Baker Ave., Schenectady, N. Y.

Apr. 21–23. Michigan Industrial Education Society, Inc., at Lansing, Mich. John H. Koenig, 4628 Flajole Rd., Midland, Mich.



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These and many other questions of significance for young people and those advising them about the world of work are answered in the new 800-page edition of the *Occupational Outlook Handbook* developed by the Bureau of Labor Statistics of the U. S. Department of Labor on the basis of data garnered from many sources, including business organizations, unions, trade associations, educational institutions, professional societies, and government agencies.

Unique Employment Guide

In releasing this comprehensive guide to future personnel requirements on the eve of a new decade, Secretary of Labor James P. Mitchell told reporters that its up-to-date employment information could assist many young people in making wise career choices and thus contribute not only to their own welfare but to the strength and economic growth of our nation.

Emphasizing the importance of bringing realistic information on America's ever changing man-power needs to the attention of young people and helping them relate it to their own aptitudes and interests, Secretary Mitchell stressed that "in our kind of economy where people are not assigned to jobs, as in a dictatorship, and where freedom of choice for the individual is a fundamental right, the needs of industry for workers must be met on a voluntary basis and this problem of guidance and advice assumes an importance which we think is very great."

Age and the Work Force

Among the factors heightening the need for guidance is the continuing rise in school enrollments — swollen by high postwar birth rates — which will be reflected in a sharp upswing in the number of young people entering the labor market in the 1960's.

Whereas today some 2 million young people join the labor force each year, the Bureau of Labor Statistics predicts that by 1970 about 3 million youth will do so, anticipating that between 1958 and 1970 the number of persons under 25 years of age who are either employed or seeking work will increase by about 7 million, or well over 50 per cent.

As set forth in the *Handbook*, although "in 1945, there were only 19½ million children in the ages 5 to 13; by 1960, there will be about 33½ million children in this age group — a rise of 14 million, or almost 75 per cent in 15 years. . . . A sharp increase will also occur among 14- to 17-year-old persons. . . . This age group will increase from about 11 million in 1958 to 14 million in 1965, and to 16 million by 1970. The number of young persons of college age — 18 to 21 — will increase from 9 million in 1958 to 12 million in 1965 and to 15 million in 1970."

The continental population of the United States which was 132,481,000 in 1945, and today is roughly 176,365,000, according to U. S. Bureau of the Census estimates will have passed the 200 million mark by 1970.

By 1970 our gross national production will have reached $750 billion (in terms of 1959 dollars), the Bureau of Labor Statistics tells us, after rising $250 billion in the 1960's.

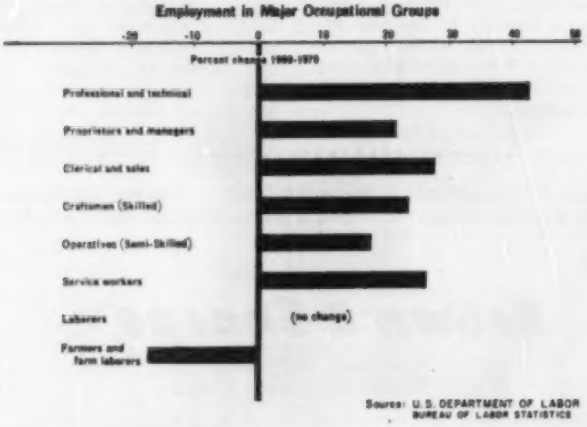
Other Bureau of Labor Statistics predictions:

To supply this amount of goods and services will require an addition to the labor force of 13½ million persons in the years between 1960 and 1970. During this period the work force is expected to grow at the rate of 1¼ million workers annually, from about 73½ million in 1960 to about 87 million in 1970.

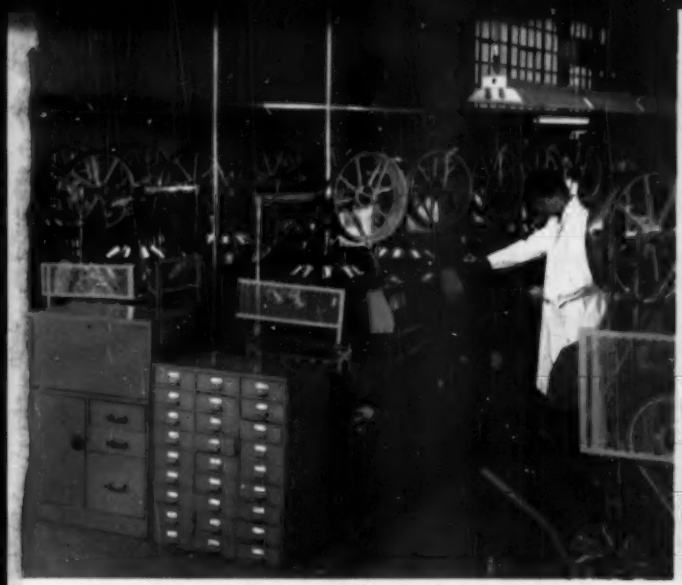
Of these 13½ million additional workers: 47 per cent (6,382,000), or about 1 in every 2, will be young people under age 25; roughly 41 per cent (5,525,000) will be over age 45; only 13 per cent (1,801,000) will be between the ages of 25 and 44; the number of workers aged 35 to 44 will decline by (166,000; 55 per cent of the additional workers will be men (their number will mount to 57.4 million in 1970, a rise of 7.5 million over the decade); and 45 per cent of the additional workers will be women (their number will in-

(Continued on page 52)

The greatest increases in employment will be in the occupations requiring the most education and training



Source: U.S. DEPARTMENT OF LABOR BUREAU OF LABOR STATISTICS



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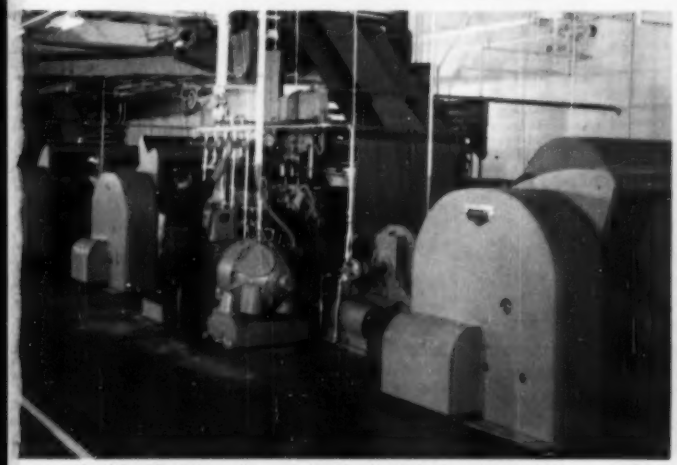

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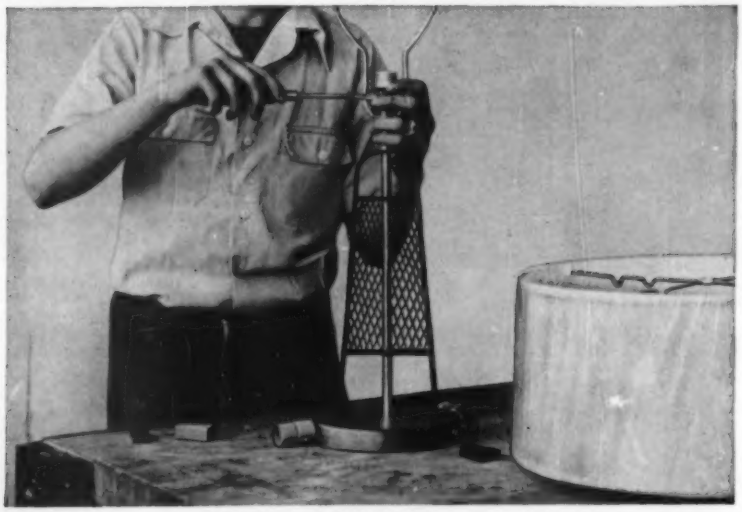

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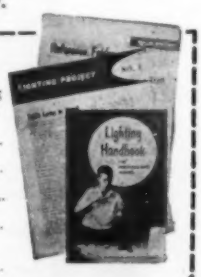

OCCUPATIONAL OUTLOOK

(Continued from page 50)

crease from 23.6 million in 1960 to 29.6 million in 1970).

Other Basic Job Trends

What kinds of job opportunities await the 26 million men and women who will begin their work careers in the decade of the '60's?

The broad trends reported in the latest revision of the *Occupational Outlook Handbook* show:

A continuing rapid growth in white-collar employment, especially in the professions. (For every 100 professional and technical workers in 1960, we will need about 143 in 1970.)

A moderately rapid increase for clerical and sales personnel and service workers. (For every 100 of these workers in 1960 we will need about 127 in 1970 as will also be true in regard to service workers.)

A slightly less rapid increase for skilled craftsmen. (For every skilled craftsmen in 1960, one will need 124 in 1970.)

A somewhat slower growth in semiskilled occupations. (For every 100 semiskilled workers in 1960, we will need about 118 in 1970.)

Little, if any, change in employment in unskilled occupations.

A further decline in the number of farmers and farm laborers. (For every 100 farm workers in 1960, we will need only 83 in 1970. Those remaining will require higher technical competence.)

In addition to providing a general summary of the employment outlook, the *Handbook* illustrates the variations and divergent trends that will occur in particular vocations and industries. Since its data pictures the situation in the country as a whole, young people planning for careers in particular locations should supplement its findings with specific information on the prevailing conditions in local areas and regions.

Forecasts for Particular Occupations

All told, the new edition of the *Handbook* describes some 600 occupations and 30 major industries. Besides supplying an appraisal of the employment prospects of each of these fields of work, this useful Baedeker furnishes current information on their job duties, the training required for beginning positions, other necessary qualifications, working conditions, and earnings.

Reflecting the activities of the space and electronics age, for the first time, reports have been included on missile and spacecraft jobs, programmers who prepare the "instructions" for electronic computers, and technicians who work closely with scientists and engineers. The latter openings are said to offer excellent opportunities to well-trained young people with manual skill, scientific interests, and mathematical aptitude who plan on less than four years of college training.

Gleanings from the vocational forecasts in the *Handbook* follow:

Engineering: The outlook is for con-

tinued growth both in the early 1960's and over the long run. Expansion of industry and increasing complexity of industrial technology, large scale private spending for research and development, and continued high levels of Government spending for defense are among the major factors expected to increase demand. The outlook will be especially good for aeronautical, electrical, and mechanical engineers.

The *scientific occupations* will also have good employment prospects. New scientific discoveries are expected in nearly all activities, resulting in an increased demand for scientists in industry, in government, in colleges and universities, and in many other areas.

Many new scientists will be needed to teach, do basic research, and develop practical applications of scientific knowledge in such fields as electronics, nuclear energy, medical research, and space exploration. Some fields will grow much faster than others. Mathematicians and physicists will have particularly favorable job prospects, while employment of meteorologists, biological scientists, and geologists will grow at a slower rate than the scientific fields in general.

Here are some other *professional occupations* in which the personnel is expected to increase rapidly over the next decade:

Physicians, dentists, nurses, and other health service workers will be needed in increasing numbers. Not only is the nation's population expanding rapidly, as has already been noted, but there is a growing awareness of the need for proper medical care. Shortages are reported in most medical professions.

Teachers will be in great demand as school and college enrollments reach unprecedented levels.

Employment of *school counselors,* which has risen rapidly since World War II, is expected to increase through the early 1960's. The shortage of qualified counseling personnel appeared, in 1958, to be the major factor limiting the expansion of employment.

The demand for trained *librarians* is expected to continue to grow well into the 1960's. Opportunities will expand for special librarians, particularly in science and technology, reflecting emphasis on industrial research. Positions will continue to be available for persons interested in part-time work.

The *skilled trades* are expected to grow at a faster rate than the nation's working population as a whole during the 1960's. There will be many thousands of job opportunities for automobile mechanics, industrial machinery repairmen, and business machine repairmen. High levels of building construction activity will mean a continued rapid rise in employment of power equipment operators, cement finishers, and electricians, and good opportunities for carpenters and bricklayers, and other skilled building trades craftsmen.

A study of the Bureau of Labor Statistics indicates that despite the phenomenal growth expected for engineers, three times as many building craftsmen as engineers will have to be trained during the 1960's to satisfy the anticipated expansion of our economy, and for each chemist we train, we will need to train three automobile mechanics.

Large numbers of openings will occur in each year of the new decade in *clerical occupations,* mostly from the very high employment turnover in this work.

Although automation of large-scale office operations will reduce demands for some types of clerical workers over the next decade, overall employment in this field will probably increase, although at a slower rate than in the 1950's. Workers in jobs requiring the use of considerable judgment or contact with other people — secretaries, receptionists, claim clerks, complaint clerks, and bill collectors, to name a few, will be among those least affected by future office automation.

Other types of *jobs* that are *slated for an increase* include over-the-road truck drivers, instrument repairmen, television repairmen, commercial artists, beauty operators, tool and die makers, and policemen.

On the other hand, the proportion of all jobs accounted for by farm workers and unskilled laborers will decline. Other sectors of our economy which may experience a decrease in work opportunities include mining, where employment has already dropped by about 15 per cent in the last 5 years, and railroad transportation.

Educational Qualifications Rising

The changing composition of our nation's labor force, reflected in the material just cited, offers a challenge to America's schools not only in respect to providing adequate guidance services, but to re-examining the entire educational program, including course offerings and teaching methods, to make certain it is geared to the changing requirements of our economy so as to furnish the kind of instruction needed by the growing number of students who will use their high school education as training for direct entry into the world of work as well as the preparation necessary for those who go on to college.

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icans for starting positions in the decade ahead will probably be keen in many occupations and geographic areas, since it seems likely from the *Handbook's* forecasts that the openings arising in entry jobs will not keep pace with the expected expansion in the number of young workers.

Of particular significance to schools is the fact that, as Secretary Mitchell points out, "the educational requirements of jobs will be rising all across the board . . . a shrinking proportion of positions will be available to untrained young people in the 1960's."

Not only will the greatest growth in employment occur in those occupations requiring the most education and training, but there is considerable evidence that in blue collar employment (craftsmen, operatives, and laborers) as well as white-collar occupations (professional, managerial, clerical, and sales) the educational qualifications are being raised.

Even in most apprenticeship programs, high school graduation is now generally required as a qualification for entry.

The jobs that are being eliminated by automation are those more routine in nature, while the new positions that automation is creating are ones requiring considerable training and skill.

The educational qualifications for new and expanding technician occupations are steadily climbing. For example, for such jobs as engineering aids, laboratory assistants, draftsmen, and electronic technicians one or two years of post high school training is now usually necessary.

Not only will high educational levels be required for entrance into a growing number of jobs, but it will become increasingly difficult for persons without a good educational background to advance to positions of greater responsibility and higher pay.

According to Department of Labor spokesmen the rising educational level of America's population, which is expected to continue to mount in the foreseeable future, in itself will be a factor tending to raise hiring standards for many jobs as the proportion of high school and college graduates available for work increases.

Two-thirds of the nation's 18-year-old youth now complete high school, the *Occupational Handbook* reports, whereas in 1900 only about 1 out of 15 did so. In 1958 one out of every six 22-year-olds had a bachelor's degree compared with 1 out of 50 in 1900.

Obtaining the Handbook

To make the information in the *Occupational Outlook Handbook* accessible to young people and their counselors, the entire publication is being reprinted in a series of 89 small, inexpensive pamphlets on individual vocations and groups of related occupations or industries.

Like the *Handbook* ($4.25 a copy), the leaflets in this *Occupational Outlook Report Series* may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. or from the regional offices of the Bureau of Labor Statistics in Atlanta, Boston, Chicago, New York, and San Francisco. A copy of the *Handbook* is available for reference in each of the 1800 local employment service offices affiliated with the U. S. Employment Service, and in many public libraries.

These materials are supplemented by the *Occupational Outlook Quarterly* which the Bureau of Labor Statistics issues to provide news of current developments affecting employment between the revisions of the *Handbook* published every two years (4 issues, $1 per year from the Superintendent of Documents, Washington 25, D. C.).

Some states are electing to use National Defense Education Act funds to purchase these guidance publications. Minnesota, for example, has decided to provide each high school in the state with a copy of the *Occupational Outlook Handbook*.

Since the U. S. Office of Education's regulations for the administration of Title 5A permit the purchase of material necessary to carry out state-approved guidance and counseling programs, you may want to check with your State Department of Education to find out if their State Plan empowers local school districts to use their Defense Education Act guidance money in this way. ◀

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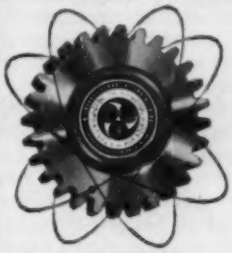

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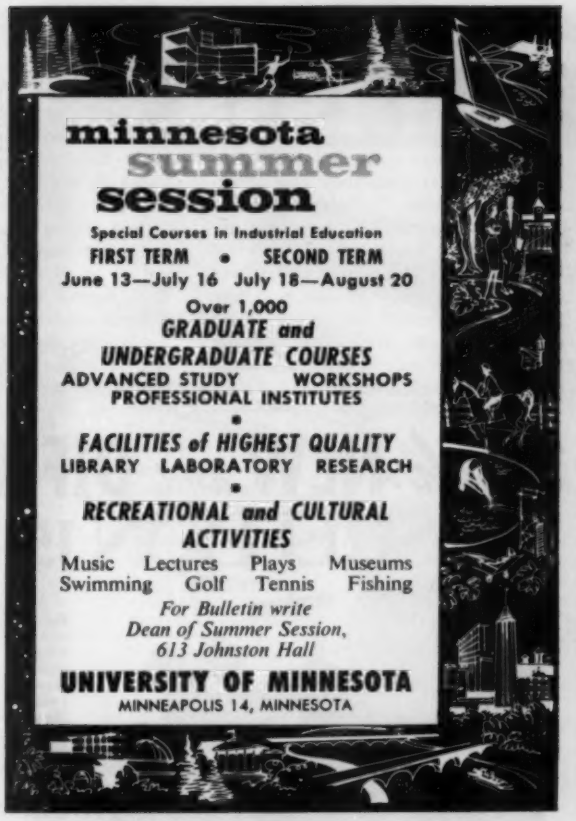

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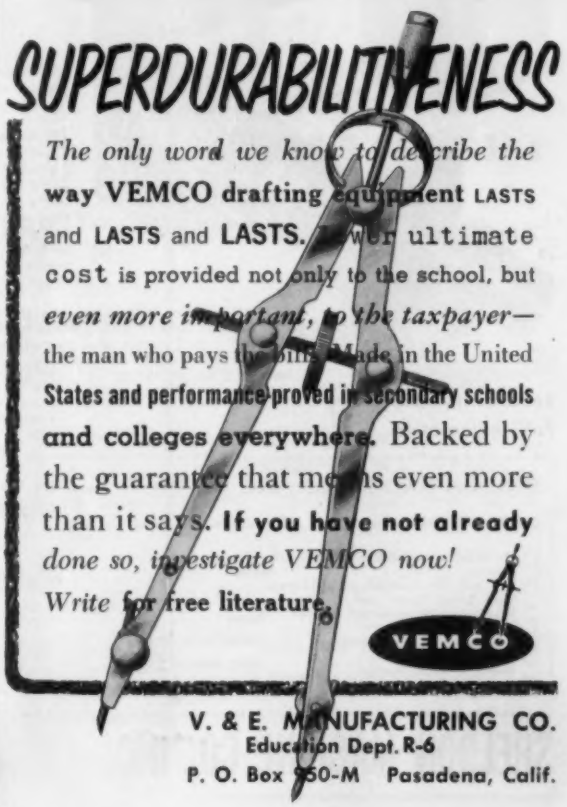

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SUPERVISION VALUES

(Concluded from page 20)

ministrator jointly share the responsibility for supervision in five per cent of the school districts.

Of particular interest is the fact that 11 per cent of the industrial arts teachers report that they are supervised by no one. Probably, in these cases, an administrator has been assigned the supervisory responsibility but has failed to visit these teachers or offer supervisory guidance. These teachers, therefore, are aware of no local supervisor. More than half of these teachers believe that they could profit from supervision.

The Value of Supervision

Supervision by a principal is not valued highly in the judgments of the industrial arts teachers. About one fourth of the teachers now being supervised only by a principal estimate this supervision to be of no value. About one half of these teachers report it has some value.

Just as the industrial arts teachers judge the supervision by the principal to be of slight value, so also do they regard the supervision by the district superintendent to be of only moderate value. Industrial arts teachers, therefore, think that school administrators are not the most effective supervisors of industrial arts. Yet the administrators are currently doing more industrial arts supervision than any other group of supervisory persons.

Although far fewer vocational directors and industrial arts supervisors than principals are responsible for the supervision of industrial arts, most teachers report that supervision by the specialists has greater value. Industrial arts teachers regard supervision by the industrial arts supervisor to be of somewhat higher value than supervision by the vocational director. One third of the teachers supervised by a vocational director only believe the director's supervision is very valuable. Over half of these teachers indicate supervision by the director has some value. Over half of the teachers who are supervised by a special industrial arts supervisor believe the special supervisor's help is very valuable.

When a principal shares the responsibility for supervising industrial arts with a vocational director or an industrial arts supervisor, the value of the joint supervision in the judgment of the teachers is less than the value of supervision by special supervisors who carry out the responsibility alone. The fact that teachers find less value in joint supervision may indicate that, when two or more persons are responsible for supervision, neither takes the initiative in providing supervision. Supervision by principals and industrial arts supervisors working together has somewhat higher value than supervision by principals working with vocational directors. The teachers report that both vocational directors and industrial arts supervisors have the greatest value when they supervise alone and do not share the responsibility.

In the judgment of the teachers, the supervision by a department head has considerable value. Almost one half of the teachers supervised by an industrial arts department head report such supervision to be very valuable. Since the department head is usually a part-time supervisor and since the teachers think highly of his supervisory assistance, the appointment of department heads may be the answer to the problem of inadequate supervision in school districts unable to employ a full-time supervisor for the industrial arts program.

In summary, in the opinions of the industrial arts teachers the industrial arts supervisors render the most effective supervisory services. Department heads and vocational directors rank second and third respectively, in their effectiveness.

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Before preparing the second edition the author sent questionnaires to hundreds of teachers who are using the popular and widely accepted original text, inviting comments, criticisms, and suggestions. These have been evaluated and correlated with numerous new processes and methods of the metalworking industries. The result is a book which is up to date educationally and technically.

The book contains several sections including, bench and wrought metal; sheet metal; art metal and jewelry; forging; heat treating; foundry; welding; machine shop; and metals in every day living.

Most of the text illustrations, photographs, and line drawings are new. All of the safety rules are emphasized by the use of color. Color is also used in certain areas of the text and illustrations for emphasis. Besides covering in detail the manipulative processes, the book also emphasizes the principles of good design, consumer information about metals and metal products, and general occupational information and avocational information.

In addition the book contains projects which make it a self-contained text. A special set of six black and white filmstrips developed specifically for this book in collaboration with the author are listed with specific reference to the unit or units with which they may be used to advantage.

— Jos. J. Lukowitz

Developing Educational Specifications for Vocational and Practical Arts Facilities

Paper, 48 pp., $1. The American Vocational Association, Washington 5, D. C.

This booklet was designed to help those responsible for the design and planning of facilities for vocational and practical arts education.

Chapters include: Educational Specifications — Why? What? How?; Organization for Educational Specifications Development; Ascertaining Community Needs; Use of Consultant Services; Agricultural Education; Business Education; Distributive Education; Home Economics Education; Industrial Arts Education; Trade and Industrial Education.

Scope and Sequence for Vocational High Schools

Shop and Related Subjects. Paper, 105 pp., 90 cents. New York City board of education, 110 Livingston St., Brooklyn 1, N. Y.

This is a reprint of a bulletin issued in 1955. It outlines the shopwork and the related subjects to be studied in the vocational courses leading to some 70 occupations. Few schools can or want to follow all of the subjects required. Happily, the city has a continuous program of curriculum revision.

Occupational Information for Counselors

Paper, 24 pp. United States Department of Labor.

This is a bibliography of counseling and guidance materials to help people select and prepare for occupations in which they may find the greatest personal satisfaction.

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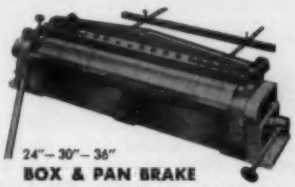

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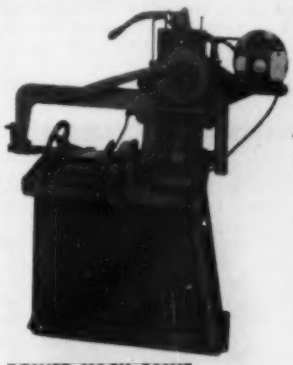

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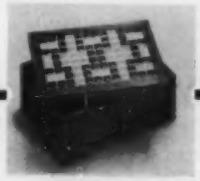

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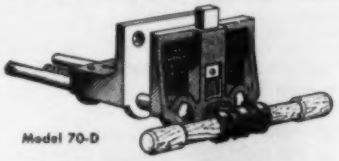

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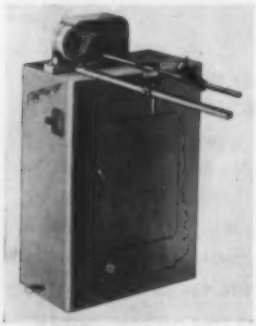
(For further details encircle index code 0201)

DI-ACRO ROD PARTER

O'Neil-Irwin Manufacturing Company are the manufacturers of the Di-Acro Power Rod Parter, in use at the Precision Screw Thread Company, Milwaukee. This company uses the machine for copper, brass, cold rolled steel and stress proof bar stock up to ⅝ in., in diameter in lengths from ⅝ to 36 in. Tolerances to .115 in., are easily held.



The Di-Acro Power Rod Parter

The Rod Parter replaces a punch press requiring a different setup for each different type of rod. The only setup needed with the Rod Parter is to adjust length gauge for length of rod desired; also, cuts are smooth so that rods can be threaded immediately without deburring.

Di-Acro Rod Parters are available in hand and power models for cutting round bar stock up to ⅝ in. in diameter. Square, rectangular, hex, and other shapes can be cut.

(For further details encircle index code 0202)

WALKER-TURNER 15-INCH DRILL PRESS

Rockwell Manufacturing Company's Walker-Turner Division have introduced a new line of versatile 15-inch drill presses, designed to provide all the ruggedness of much heavier presses.

The new line includes 40 models available with high or slow speed, single or multiple spindle, No. 2 Morse taper or 0-½-in. key chuck spindle and standard or production table. In addition, components of the press may be obtained for making up special purpose equipment.

Primarily a production-line tool for metalworking, the new machine is versatile enough to make it suitable for small commercial shops.

New Walker-Turner 15-Inch Drill Press

Extra ruggedness is provided by four oversized, preloaded, lubricated-for-life ball bearings incorporated in the spindle construction. A heavy-weight head, cast in a single piece, and a large, two-inch diameter quill provide rigidity and longer life. A multiple-spline "floating drive" means less vibration, smoother operation, and more power at the spindle.

Slow and high speed models offer a range of 470 to 4600 r.p.m., with a choice of four speeds in each model. A multi-speed attachment permits even wider ranges for such special operations as reaming at slow speeds and small hole drilling at high speeds. The drill press is powered by a ⅓- or ½-horsepower motor. Spindle travel is $4\frac{9}{16}$ inches.

The new line of drill presses also offer: (1) a new Universal Hand Feed mechanism that combines the best features of pilot wheel and single lever feeds, and (2) a streamlined Quick-Change belt guard that completely encloses belt and pulleys for safety.

Further information available.

(For further details encircle index code 0203)

NEW FUNCTIONAL ACCESSORY GROUP FOR THERMOLYNE ELECTRIC FURNACE

Thermo Electric Manufacturing Company announces six new functional accessory groups that let one model electric furnace perform several distinct operations. The following accessories make Type 2100 Thermolyne Furnace more adaptable and versatile than before as a salt bath, oil bath, melting, vertical muffle, or crucible furnace:

TYPE 2100 THERMOLYNE FURNACE

Two special-alloy stainless-steel pots with cover for liquid heating to 1000 deg. F. and 1600 deg. F., a safety lifting handle for the pots, a perforated stainless-steel small parts' basket with lifting handle, a perforated stainless-steel skimmer for removing sludge or crust, a graphite melting ladle for use to 1700 deg. F., with unique no-slip lifting handle, a high-temperature refractory chamber liner, and a heavy well-insulated refractory chamber cover.

The laboratory or shop user selects that combination of accessories best suited to his needs. He will find that Type 2100 Furnace is capable of a variety of investigative and pilot runs as well as short-run production and the heat-treating of small parts.

Economy of initial purchase and the saving of space are objectives achieved by this furnace.

In keeping with the aim of maximizing user-convenience, the manufacturer provides a thorough and detailed set of operating instructions.

Literature and information are available on request.

(For further details encircle index code 0204)

"MILLRITE" VERTICAL MILL WITH NEW COMPOUND SWIVEL HEAD

A compound swivel head has been announced by the U. S. Burke Machine Tool

"Millrite" Vertical Mill

Company, for the U. S. Millrite, the company's new full-size dovetail ram and

turret vertical toolroom milling machine. The swivel provides for double angle settings, increasing even further the unusual range and capacity of this economical mill.

Equipped with the compound swivel, this vertical mill provides universal flexibility, yet maintains accuracy to accepted machine tool tolerances and increases its productivity for precision milling and boring operations.

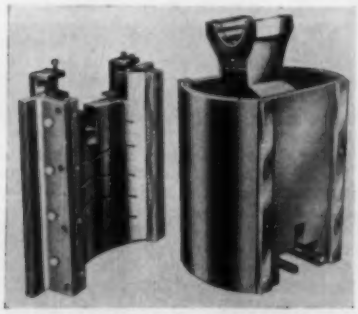
With the compound swivel overarm, throat distance, spindle to column face, is 17 in. maximum, 6½ in. minimum; maximum distance from the nose to the top of the 7 by 27-in. table is 18 in. Table feeds are: longitudinal 16 in., crossfeed 8 in. There is 15 in., of vertical knee travel, with ram movement of 12 in., and quill travel of 4 in.

Full information on the new U. S. Millrite and its compound swivel head is available from the manufacturer.

(For further details encircle index code 0205)

IMPROVED CYLINDRICAL TYPE RAM-WAY ON HAVIR PRESSES

To provide the extra rigid ram support required by carbide dies the exclusive cylindrical type ram on Havir (formerly Diebel) Hi-Production Automatic Presses has been improved according to Sales Service Mfg. Company.



Improved Cylindrical Type Ram

The improvement consists of the addition of flat bearing area at each side of the curved bearing at either end of the ram on all presses over 25 tons. All Havir Presses 25 tons and under have full cylinder ram bearings. In addition to adding bearing area, more complete support from every angle is provided for the ram. This added flat bearing consists of a bronze insert on the ram, that is easy to adjust for wear or to replace, and an adjustable steel gib on the bearing. This provides greater resistance to deflection or "cocking" of progressive dies where the maximum load is off-center.

Further information available on the improved Havir cylindrical type ram.

(For further details encircle index code 0206)

IMPROVED RAPID ACTING ROLLER VISE

Now under new management the Abernathy Vise & Tool Company have improved various features of their Rapid Acting, continuous Screw Vise. They have been designed to overcome some defects apparent in vise construction.

Abernathy also manufacture the solid nut, nonrapid acting vise. Unnecessary complication is a detriment in any mechanical device. Abernathy Roller Nut Vises have but one part in addition to the elements or an old style slow acting type

Improved Roller Vise

screw vise — and that is the "roller," which is a large substantial casting.

Abernathy Roller Nut Vises have no springs, but depend upon the weight of the rollers for their action.

Sectional nuts are used in all rapid acting continuous screw vises. Roller nut vises are so constructed that it is impossible for the nut section to rise or the screw to spring out of engagement.

The roller is a balanced cylinder containing a tapered dovetail mortise into which the nut section is fitted; the roller simply hangs upon the screw, and due to its weight and resulting frictional contact between these two parts the roller rolls in any direction the screw is turned.

Roller nut vises are made of fine quality gray iron castings, well machined and nicely finished, with cold drawn steel slides, with extra smooth and accurately milled steel screw. Choice of colors red, olive, or gray.

For complete information write for new brochure.

(For further details encircle index code 0207)

(Continued on next page)

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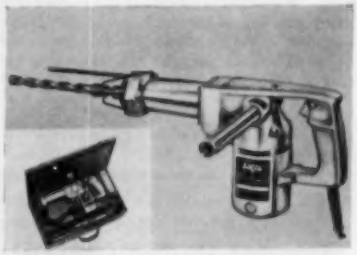
SHOP EQUIPMENT NEWS

(Continued from previous page)

SKIL ROTO-HAMMERS

Skil Corporation announces two new electric Roto-Hammers each of which will do 3 distinct operations — hammering with simultaneous power rotation; hammering without rotation; or drilling without hammering.



New Skil Roto-Hammer Model 726

Comparative on-the-job tests, using Skil carbide bits in masonry, show that the Model 726 is capable of drilling a ¾-in. hole three times faster than other electric hammers.

In addition the automatic rotation often eliminates the need for a second man formerly required to hand-turn a star drill when drilling larger holes. Corresponding labor savings result and operation fatigue is reduced.

The 3-way operation is accomplished by an exclusive combination of electro-pneumatic drive and a constantly rotating inner barrel. Instead of a spring or other connecting parts, the hammering action is provided by powerful air pressure built up between the piston and striker. The electro-pneumatic drive provides a steady, powerful hammering action with far less vibration.

When a carbide bit with a hexagon shank is locked into the inner barrel nose, the Roto-Hammer provides a combination of hammering and automatic rotation.

In the electrical, plumbing, air conditioning, pest control, and other industries that often require drilling into concrete, wood, or metal on a single job, the Roto-Hammer will eliminate changing from a hammer to different tools. This one tool can be used to drill in each of the different materials.

Other features add to the remarkable versatility of the hammers. For additional information write to the manufacturer.

(For further details encircle index code 0208)

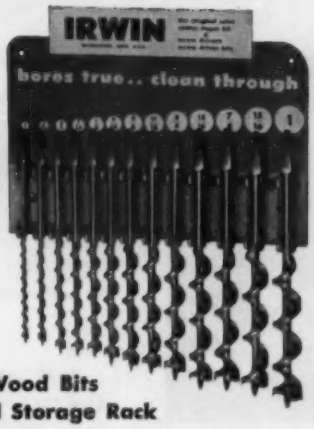
NEW KNIGHT MODEL KN-520 STEREO AMPLIFIER

Allied Radio Corporation have recently released the new Knight KN-520 20-Watt Stereo Amplifier, which features dual 10-watt amplifier-preamp sections with inputs for either magnetic or ceramic stereo cartridges. The KN-520 is recommended for use in economy priced stereo or monophonic music systems.

The new amplifier delivers 20 watts of stereo or monophonic sound, with peak power of 40 watts. Three pairs of concentric controls permit precise adjustment

(Continued on page 62)

IRWIN School Shop Special



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SIZES ¼ to 1"

Set of 13 Irwin Wood Bits and colorful Metal Storage Rack

This new Irwin bit set and rack helps keep tools in place, teaches neatness in your shop. Assignments will be completed quicker, too. Irwin solid center bits cut clean, fast, accurate. Each Irwin bit hardened full length to stay sharp longer. Durable steel rack screws on wall or bench. Patented spring-steel clips hold bits firmly in place. Size markings on rack for easy selection. Quantity limited—so see your independent hardware dealer soon.

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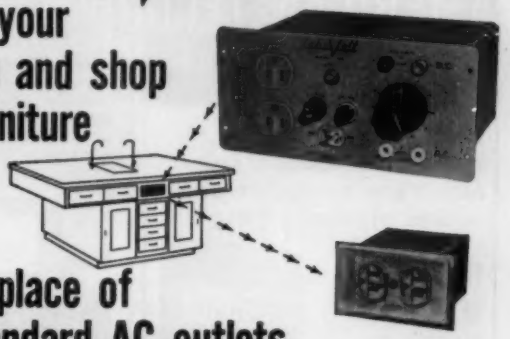

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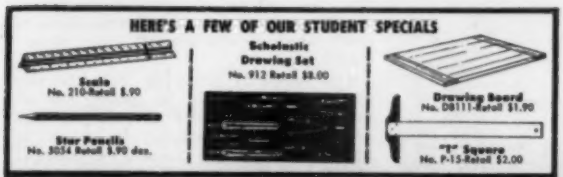

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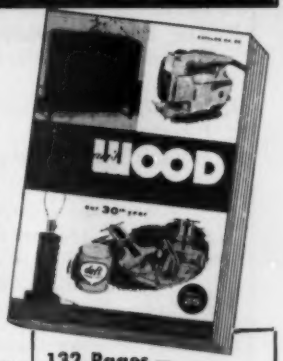

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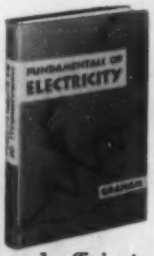

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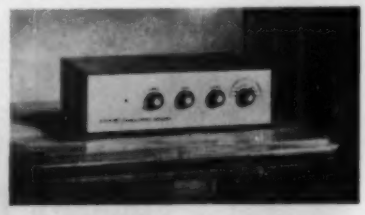
SHOP EQUIPMENT NEWS

(Continued from page 60)

of each channel; separate bass and treble controls can be used to compensate for dissimilar tonal characteristics between the speakers used for each channel. A concentric volume control allows individual channel balance or overall volume control.



New Knight Model KN-520 Stereo Amplifier

Frequency response of the KN-520 is 40 to 15,000 cps. plus-minus 1 db, at average room level. Distortion is less than 1.5 per cent at 50 cps; 0.5 per cent at 20,000 cps. Hum and noise levels are better than 52 db below full output, measured at tuner and ceramic phono inputs, and better than 40 db below full output at magnetic phono input. Three pairs of inputs accommodate magnetic phono (RIAA-equalized), ceramic phono and tuner. Output impedances are 8 and 16 ohms. The KN-520 employs four new 7408 hi-fi audio output tubes in its circuitry, and features d.c., on preamp filaments for hum-free operation.

Listed under Stock No. 92 SX 432, it is complete with metal case finished in dark brown, with brushed brass front panel.

(For further details encircle index code 0209)

REVERSIBLE ½-IN. SPECIAL DRILL

A new version of Black & Decker's most popular general purpose tool — the ½-in. Special Drill — incorporates a convenience feature previously available only in heavy-duty units.

Reversible ½-inch Special Drill

Designated in the Black & Decker Golden Anniversary catalog as the new Reversible ½-Inch Special Drill, the new tool is fitted with a special fool-proof switch by which full power can be applied to turn the auger in reverse, causing it to literally back itself out of the drilled hole.

The new drill offers greater power, better balance and less weight than previous models of this drill. It has a drilling capacity of ½ in., in steel, ¾ in., in masonry with special bit, 1 in., in hardwood with auger, and up to 1½ in. sheet metal with hole saws. It has a wide variety of applications among installation and service trades and its reversible feature is particularly advantageous in installation and maintenance work on telephone and power line poles. It has equal value in fence building, tree surgery, pest control, and all types of wood and frame construction and maintenance.

Additional information available.

(For further details encircle index code 0210)

BRETT-GUARD'S IMPROVED SHATTER RESISTANT PLEXIGLAS SHIELD

Brett-Guard Corporation recently completed an improvement on their saw guard whereby the safety device now comes with an improved aircraft type shatter resistant plexiglas shield that covers the saw allowing full vision and complete accuracy in every type of circular saw operation. The new shield protects the operator from flying chips.

Brett-Guard's improved aircraft type, shatter resistant, Plexiglas Shield covers the saw allowing the operator full vision and complete accuracy in every type of circular saw operation.

The new tool prevents physical contact with the blade and resists displacement while in use. This safety guard is available for all circular table saws with blades of 6 to 16 inches in diameter.

It provides a safe and efficient fully adjustable method of making various "heretofore" impossible-to-guard types of cuts. With Brett-Guard in place on a circular saw, the operator can safely saw in such dangerous operations as mitering, cross-cutting, compound mitering, and ripping. Even in rabbeting, tenoning, dadoing, feathering, diagonal sawing, template cutting, drop sawing, plowing, and tonguing, the Brett-Guard is a safety tool that's a must where production efficiency is required.

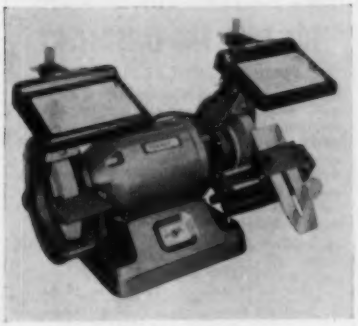
The ingenious guide-pin holes in the plexiglas shield make the setting up of unusual jobs extremely fast, simple, and accurate. The pressure pin is used as a hold-in for horizontal pressure. "C" clamps, spring hold-ins, and hold downs are now eliminated. Setup is so simple that it is extremely economical to run job lots or only a few pieces.

Further information to be had by writing.

(For further details encircle index code 0211)

STANLEY'S HEAVY-DUTY GRINDER

A new (No. 697) ½ h.p. heavy-duty grinder for school and industrial shops incorporating the most modern grinding equipment has been announced by Stanley Electric Tools, division of The Stanley Works. It supersedes the No. 277 school grinder which has been widely used for grinding plane irons and chisels in school and vocational shops across the country.



Stanley's No. 697 Bench Grinder

The new grinder features a new and improved plane iron and chisel grinding attachment designed for grinding to perfect condition the cutting edges of plane irons and chisels up to 2⅜ in. wide. A micro-adjusting screw permits feeding the tool to the wheel for as fine a cut as desired. The tool holder clamps the face side of the plane iron or chisel against the machined top plate of the holder. A small set screw and lock nut aligns the plane iron in the holder. To obtain an approximate 25-deg. bevel, the iron or chisel may be located 1¾ in., out of the holder. Pressure on the holder with plane iron or chisel in place brings holder in contact with both horizontal rods when grinding to assure the necessary light pressure against the revolving wheel for perfect results. The holder may be removed for inspection while sharpening and replaced in the identical position for continued grinding. If pressure is released on the holder, during the grinding operation, it drops back away from the grinding wheel automatically.

The grinder has a special slow-speed motor, is full ball bearing and lubricated for life. Heavy-duty extended frame construction permits grinding of odd-shaped parts. No. 697 grinder is delivered complete with Stanley Fludlite eyeshields, two specially designed grinding wheels (one extra-fine, one coarse), cast-iron tool rests, and new plane iron and chisel grinding attachment.

(For further details encircle index code 0212)

MODEL TPC-60 PLANNING CENTER

The Tolerton Company announces a new Planning Center . . . Model TPC-60. This new Planning Center has an upper case with two fully adjustable and removable 12-in. deep shelves behind sliding glass doors. Bottom cabinet has one adjustable, removable 30-in. deep shelf closed with sliding wood doors. Separate tracing table

Planning Center Model TPC-60

fitted with two fluorescent lamps and heavy plate glass working surface may be bought separately or as part of Planning Center.

The overall width of the cabinet without tracing table is 60 in.; the height of the cabinet is 78 in., with 30-in. high working area; weight of complete unit 490 lb.

Complete information available from The Tolerton Company.

(For further details encircle index code 0213)

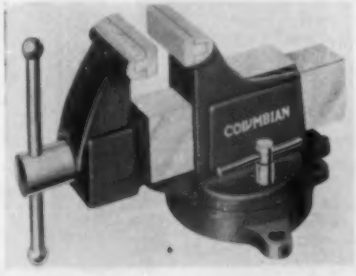
NEW LINE OF MACHINISTS' VISES

The Columbian Vise & Mfg. Company has announced their new line of machinists' vises, featuring guaranteed unbreakable malleable iron castings.

Vises are available in 7 sizes — 3, 3½, 4, 4½, 5, 6, and 8-inch jaw widths — in both stationary and swivel base types. Stationary vises can be easily converted to swivel base operation by the addition of a new swivel kit, reputed to be an important innovation in vise design. Swivel bases move a full 360 deg., and a forged steel, tapered-gear lock bolt prevents slippage.

Among the outstanding new vise features are the longer back jaw body, precision-machined nut and keyway which assure perfect alignment. The front jaw beam covers and protects the cold-rolled steel screw. Malleable iron unbreakable front jaw is reinforced with heavy internal ribs. The new vises also have replaceable hardened tool steel "T" jaw faces. These are anchored securely by top drive pins, so they cannot come loose, but are easily replaceable. There are no screw heads or screw holes in the working face.

Another advantage of the new vise includes steel handle balls. All vises, except 6- and 8-inch sizes, have large ground and polished anvils.



Columbian's Machinist Vise

(Continued on next page)

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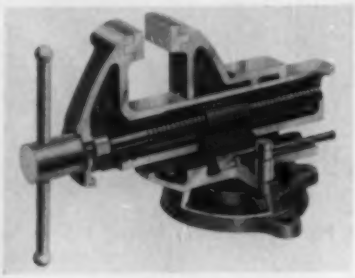
SHOP EQUIPMENT NEWS

(Continued from previous page)



Cut-Away View of Vise

For complete specifications for new Columbian swivel base vises, and full details, write to the manufacturer. Ask for L-1154A.

(For further details encircle index code 0214)

NEW PHOTO POSITIVE PAPER

Eugene Dietzgen Company have introduced their new direct photoprint paper, produced to clarify mechanical drawings. No matter how faded the pencil sketch or how battered the blueprint, sharp copies may be made with your own equipment — no negatives needed — positive prints direct from positive originals.

You may specify extra-thin, .003-in. thick, 100 per cent rag content paper, or extra-strong vellum. Both may be processed in ordinary room light using standard photographic solutions. Both are of uniform quality and produce clear, sharp intermediate prints or printing masters. Makes wet-erasable prints ready for redrawing with pen or pencil.

Further information on these time and money-savers is available from the Eugene Dietzgen Company.

(For further details encircle index code 0215)

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Installation of the Bruning system makes possible additional savings, since the equipment can be used in the microfilming of other records which must be permanently maintained.

For further information contact the Charles Bruning Company, Inc.

(For further details encircle index code 0216)

NEW BAND-SAW BLADE

Millers Falls Company have announced a new band-saw blade containing Vanadium Carbide. Named Jet Band, it is being introduced for general sale after extensive laboratory testing for several years and more than a year of trial use in the field.

Jet band is made from an entirely new alloy steel, specially developed for band saws. It contains a high proportion of Vanadium Carbide which is harder than the aluminum oxide in grinding wheels and twice as hard as carbon band-saw blades.

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Write for further information.

(For further details encircle index code 0217)

NEW HIGH FIDELITY SPEAKER SYSTEM SEMI-KITS

The Electronic Instrument Company have announced three new high fidelity speaker systems, available as semi kits. Two of these systems, the HFS-3 and HFS-4, are three way systems; the HFS-5 is a two-way, bookshelf-size system.

Three-way speaker systems HFS-3 and HFS-4 are designed to reproduce exceptionally pure and full tones of the very deep bass frequencies with normal efficiency. They are identical in all respects but the tweeter. The HFS-3 incorporates a 3½-in. cone tweeter, with a level control, for softer, more delicate quality in the highs. The HFS-4 includes a compression-driver horn tweeter, with a level control, for those who prefer their highs with greater brilliance and projection.

Both three-way systems are supplied with a 12-in. bellows suspension woofer (1¾-lb. Alnico 5 d.c. magnet, 22 cps. free-air resonance, 1-in. maximum double peak movement), and an 8-in. closed back mid-range speaker with a high internal damping cone for smooth response. Frequency response of the HFS-3 and HFS-4 (in an along-the-wall position) is essentially uniform from 45 to 14,000 cycles. Response is only 10 db down from average level at 28 cycles. Continuous rated power handling is 30 watts program material: amplifier power requirements are a clean 10 watts; rated impedance is 16 ohms.

(Continued on next page)

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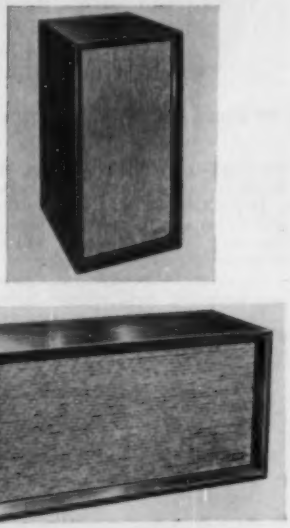
SHOP EQUIPMENT NEWS

(Continued from previous page)

EICO's new HFS-5 provides extremely clean, deep, smooth bass for a bookshelf-size enclosure — 24-in. high by 12½ in. wide by 10 in. deep. It uses an 8 bellows-suspension woofer (10.7 oz. Alnico 5 d.c. magnet, 45 cps. free-air resonance, ⅜-in. maximum double peak excursion), and a 3½-in. closed back tweeter of exceptional



High Fidelity Speaker Systems
HFS 4 and 5

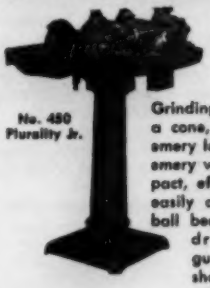
quality. As in the HFS-3 and HFS-4 systems, the impregnated cloth bellows woofer suspension underlies the excellence of the bass reproduction. Frequency response (along-the-wall position) of the HFS-5 is essentially uniform from 52–14,000 cps. The octave from 40 to 80 cps. is undistorted and entirely usable.

EICO's new high fidelity speaker systems are available in unfinished, smooth-sanded birch, oil walnut, satin mahogany or oil teak to match any decor.

Additional information on many other fine features of these high fidelity speaker systems is available upon request.

(For further details encircle index code 0218)

TOOLS ALWAYSSHARP WITH PLURALITY OILSTONE TOOL GRINDERS



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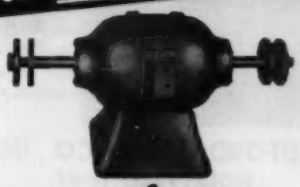

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NEW KODAK EKTALITH METHOD

A new method of making inexpensive paper masters for offset reproduction of any type of printed, typed, written or drawn original has been introduced by Eastman Kodak Company.

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(For further details encircle index code 0219)

Descriptive Material . . .

TIPS-TECHNIQUES AND DRAFTING AIDS

Alvin & Company, Inc., have announced their new booklet entitled "Tips-Techniques and Drafting Aids" which contains 32 pages of illustrated, helpful hints.

The booklet is divided into the following classifications: Helpful Drawing Techniques, Simplifying Drafting Practices, Protecting Prints and Drawings, Tips for Drawing Lines and Curves, Modifying Equipment for Extended Use, and Getting the Most from Drawing Instruments. Fifty cents per copy.

(For further details encircle index code 0220)

(Continued on next page)

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Descriptive Material . . .

(Continued from previous page)

NEW X-ACTO HOBBYCRAFT BOOK

X-acto, Inc., manufacturer of hobbycraft tools and kits, have prepared a new 27-page guide for dozens of craft projects. Step-by-step instructions and tool use hints are included in the book which is priced at 25 cents, and is available at department, hobby and hardware stores. Copies may also be obtained directly from X-acto, Inc.

An excellent guide for crafts teachers, scout leaders, camp counselors and craft-minded boys and girls, the new paper-bound 9½ by 11-in. "Project Handbook and Hobby Tool Guide" offers varied hobby projects in woodcarving, model building, leathercraft, Indian beadwork, and other activities. Profusely illustrated, the book is designed to guide beginners and advanced hobbyists in the proper use of craft tools used in a range of projects.

Additional information on other X-acto publications may be obtained by writing to the manufacturer.

(For further details encircle index code 0221)

SAMS PUBLICATIONS ANNOUNCED

Servicing Hi-Fi and FM in the Customer's Home, by Milton S. Kiver. Catalog number SHF-1, 160 pp., 5½ by 8½ in., illus., $2.95.

In this book a wide range of quick and easily-performed test methods are described for high fidelity amplifiers, AM-FM receivers, record changers, turntables and tape recorders. All testing methods are selected for their quick application and for their effectiveness in locating actual and potential trouble areas in Hi-Fi equipment.

Dial Cord Stringing Guide, Volume 7. Catalog number DC-7, 80 pp., 5½ by 8½ in., $1.

This new guide shows exact positions of dial cords used in home entertainment equipment produced in 1958–59. This series has long been a favorite of TV-radio service technicians when it comes to solving the often complex problem of repairing or replacing dial cords.

Howard W. Sams Handbook of Electronic Tables and Formulas, compiled and edited by the Sams Engineering Staff. Catalog number HTF-1, 134 pp., 5½ by 8½ in., hard-bound, $2.95.

This new and practical reference work has been specially prepared to meet the needs of electronic technicians, engineers, students, hobbyists, and anyone interested in the subject. It contains those tables, charts, formulas, and laws that are essential for all who work in electronics. Five comprehensive sections include: Formulas and Laws of Electronics; Constants, Standards, Symbols, Codes; Service and Installation Data; Miscellaneous Data. A full-color, six-page fold-out contains a frequency spectrum chart based on latest 1959 FCC allocations.

Sold by electronics parts distributors and bookstores throughout the country, or available from Howard W. Sams & Co., Inc.

(For further details encircle index code 0222)

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READER'S SERVICE SECTION

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The index and digest of advertisements below are provided for your convenience in requesting free product information, catalogs and literature offered by the advertisers and the manufacturers listed in Shop Equipment News. To obtain this information or literature, encircle code numbers, sign the card, and mail. Your request will receive prompt attention.

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